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AUTHORS OF ORIGINAL CONTRIBUTIONS TO VOLUME XXXV.

Alden, A. M., St. Louis, Mo.
Almour, Ralph, New York, N. Y.
Amsden, H. H., Concord, N. H.
Babbitt, Jas. A., Philadelphia, Pa.
Baer, Louis, Philadelphia, Pa.
Bailey, Fred W., Cedar Rapids, Ia.
Bailey, H. T., Phoenix, Arizona.
Barlow, R. A., Madison, Wis.
Barnes, W. H., Philadelphia, Pa.
Beck, F. A., Allentown, Pa.
Beck, Jos. C., Chicago, Ill.
Berlin, J. I., Jersey City, N. J.
Blackwell, Hugh B., New York, N. Y.
Blumenfeld, Louis, Brooklyn, N. Y.
Bowers, Chester, Los Angeles, Cal.
Briggs, F. W., Duluth, Minn.
Brooks, Harlow, New York, N. Y.
Bugbee, Edwin P., Detroit, Mich.
Butler, Margaret F., Philadelphia, Pa.
Bayard, D. S., New York, N. Y.
Caldwell, J. W., Nashville, Tenn.
Byard, D. S., New York, N. Y.
Chipman, L. DeV.,
St. John, New Brunswick.
Clerf, Louis H., Philadelphia, Pa.
Cohen, S., Philadelphia, Pa.
Cullom, M. M., Nashville, Tenn.
Dabney, S. G., Louisville, Ky.
Dean, L. W., Iowa City, Iowa.
Delavan, D. Bryson, New York, N. Y.
Dench, E. B., New York, N. Y.
Dennis, F. L., Colorado Springs, Colo.
Dintenfass, Henry, Philadelphia, Pa.
Dowling, J. I., Albany, N. Y.
Drury, D. W., Boston, Mass.
Duel, Arthur B., New York, N. Y.
Dunning, Henry S., New York, N. Y.
Effler, Louis R., Toledo, Ohio.
Eves, Curtis C., Philadelphia, Pa.
Ezell, Herschell, Nashville, Tenn.
Faulkner, E. Ross, New York, N. Y.
Fisher, Lewis, Philadelphia, Pa.
Fletcher, Harvey, New York, N. Y.
Forbes, Henry H., New York, N. Y.
Fowler, Edmund P., New York, N. Y.
Fox, Noah, Chicago, Ill.
Friesen, J. Frank, Los Angeles, Cal.
Friesner, Isidore, New York, N. Y.
Gatewood, E. Trible, Richmond, Va.
Gifford, Mabel F., San Francisco, Cal.
Gill, Elbyrne G., Roanoke, Va.
Ginsberg, Wm., New York, N. Y.
Glassburg, John A., New York, N. Y.
Goldstein, Max A., St. Louis, Mo.
Goodyear, Henry M., Cincinnati, O.
Gottlieb, Mark J., New York, N. Y.
Greenbaum, Sigmund, S.,
Philadelphia, Pa.
Greenstein, A., New York, N. Y.
Guggenheim, Louis K., St. Louis, Mo.
Hanger, F. M., Staunton, Va.
Harris, M. L., Brooklyn, N. Y.
Harris, Thos. J., New York, N. Y.
Hart, V. K., Statesville, N. C.
Haseltine, Burton, Chicago, Ill.
Hastings, Hill, Los Angeles, Cal.
Hayden, D. B., Chicago, Ill.
Hays, Harold, New York, N. Y.
Heller, I. M., New York, N. Y.
Herzig, A. J., New York, N. Y.
Higbee, David R., San Diego, Cal.
Howard, E. F., Vicksburg, Miss.
Howard, Robert C., New York, N. Y.
Huey, Arthur J. New York, N. Y.
Hurd, Lee M., New York, N. Y.
Hyde, F. T., Port Angeles, Wash.
Ide, Cdarence E., Long Beach, Cal.
Iglauer, Samuel, Cincinnati, O.
Imperatori, C. J., New York, N. Y.
Isaacs, Harold J., New York, N. Y.
Ittleson, M. S., New York, N. Y.
Jesberg, Simon, Los Angeles, Cal.
Jones, Isaac H., Los Angeles, Cal.
Jones, Marvin, New York, N. Y.
Keiper, Geo. F., Lafayette, Ind.
King, James J., New York, N. Y.
Kleinert, Margaret N., Boston, Mass.
Klepper, Julius, New York, N. Y.
Kopetzky, Samuel J., New York, N. Y.

KULKIN, SAMUEL, New York, N. Y.
LEBENSOHN, J. E., Chicago, Ill.
LEDERER, FRANCIS L., Chicago, Ill.
LEE, F. H., Richmond, Va.
LEE, W. B., Nashville, Tenn.
LEWIS, EUGENE R., Los Angeles, Cal.
LEWIS, FIELDING O., Philadelphia, Pa.
LUKENS, ROBERT M., Philadelphia, Pa.
LYMAN, HARRY W., St. Louis, Mo.
MCCOY, JOHN, New York, N. Y.
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MAYBAUM, J. L., New York, N. Y.
MAYER, EMIL, New York, N. Y.
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MOERSCH, HERMAN, Rochester, Minn.
MOLT, WM. F., Indianapolis, Ind.
MOORE, WM. F., Philadelphia, Pa.
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MYERS, E. LEE, St. Louis, Mo.
MYERSON, M. C., Brooklyn, N. Y.
NEWKIRK, H. D., Anaheim, Cal.
NEWMAN, MORRIS E., Buffalo, N. Y.
NUSSBAUM, D., Philadelphia, Pa.
OLSHO, SIDNEY L., Philadelphia, Pa.
PAGE, J. R., New York, N. Y.
PEARLMAN, S. J., Chicago, Ill.
PHELP, G. M., New York, N. Y.
PHELPS, K. A., Minneapolis, Minn.
POLISAR, J. M., Brooklyn, N. Y.
POLLOCK, HARRY L., Chicago, Ill.
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PRATT, J. A., Minneapolis, Minn.
RAMIREZ, M. A., New York, N. Y.
REDER, MILTON, New York, N. Y.
REHFELDT, C. S., St. Louis, Mo.
RICHARDS, JOHN D., New York, N. Y.
ROBERTS, E. L., Nashville, Tenn.
ROSEN, S., New York, N. Y.
ROSENTHAL, MORRIS, New York, N. Y.
ROSS, MARTIN, New York, N. Y.
RUSKIN, SIMON L., New York, N. Y.
SALERNO, J. J., New York, N. Y.
SCHATZ, HARRY W., Philadelphia, Pa.
SCHWARTZ, VIRGIL, Minneapolis, Minn.
SELKIN, SAUL J., New York, N. Y.
SHAMBAUGH, GEO. E., Chicago, Ill.
SHEEHAN, J. E., New York, N. Y.
SHEKTER, A. J., Jamaica, N. Y.
SHEMELEY, WM. G., JR., Philadelphia, Pa.
SHORE, F. E. V., Des Moines, Ia.
SHUSTER, BENJ. H., Philadelphia, Pa.
SIEGMEISTER, WM., Brooklyn, N. Y.
STAUFFER, NATHAN P., Philalelphia, Pa.
STILES, PORTER, Birmingham, Ala.
STOUT, PHILIP S., Philadelphia, Pa.
TUCKER, GABRIEL, Philadelphia, Pa.
VAN POOLE, G. M., Honolulu, T. H.
VINSON, PORTER, P., Rochester, Minn.
VOORHEES, IRVING W., New York, N. Y.
WARING, J. B. H., Blanchester, Ohio.
WATSON, W. R., Philadelphia, Pa.
WEGEL, R. L., New York, N. Y.
WHELAN, GEO. L., Philadelphia, Pa.
WHITE, FRANCIS W., New York, N. Y.
WHITE, LEON E., Boston, Mass.
WIEDER, H. S., Philadelphia, Pa.
WOLF, GEO. D., New York, N. Y.
YANKAUER, SIDNEY, New York, N. Y.
YERGER, C. F., Chicago, Ill.

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ORIGINAL COMMUNICATIONS.

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ACOUSTIC LACUNAE.

DR. DANA W. DRURY, Boston, Mass.

In the race history of animals or other related groups of organic life, it is generally conceded that hearing begins only when the cochlea develops as an intimate part of the labyrinth.

The fibres of the auditory nerve pass up through the column of the cochlea, across the bi-polar ganglion cells which form the spiral ganglion, and thence along grooves in the spiral lamina, ending in arborizations partly in the inner and partly among the outer hair-cells. Anatomy teaches that the outer, somewhat constricted, end of each hair-cell is limited by a sharply defined cuticular zone, from the free surface of which project, in man, some twenty-five rods or hairs. The inner hair-cells are less numerous (according to Retzius about 3,500[1] as well as shorter and broader, than the corresponding outer elements. Their elation to the inner rods of Corti is such that, to every three rods two hair-cells are applied. The outer auditory or hair-cells are about five times more numerous (approximately 18,000 according to Waldeyer[2] than the corresponding inner elements. We, as individuals, are able to distinguish some ten different notes a second.

McKendrick[3] has calculated that the number of fibres, respectively, in the auditory nerve and basilar membrane, together with that of the hair-cells and arches of Corti, is sufficient to apprehend the approximately 11,000 different pitches in the auditory scale.

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Errors of judgment of the direction of the source of sound waves are frequent, reflected sound appearing louder than that transmitted in a straight line. The causes are two-fold, depending on the one hand on the resonant character of the reflected surface, on the other on the relative acuity of the two receiving mechanisms. This latter reason determines the fact that with complete unilateral deafness, all sound seems to have its origin on the side of the healthy ear. The distance and direction from which sounds come to the ears are not perceived directly, but are estimated by a judgment based on the loudness and quality of the sound sensation, combined with a power of reasoning from past experiences.

The character of the "absorption spectrum" of aural acuity—if one may thus designate it—exhibits wide divergences in character as the result of an equally large number of determining causes. For example, Hartmann[4] recorded that localized residua of tone perception were observed more frequently in the congenital deaf or deaf-mute than in those with acquired deafness. On the other hand, it has also been reported that children who become deaf after birth learn to use their speaking voices with less difficulty than those who are congenitally deaf. The obvious explanation would seem to be that, assuming the larynx to be normal, the child who has heard its voice learns the more readily to use and place it, than one with whom there has been no initial perceptual experience.

The acoustic lacunae above mentioned form an intersting study, and one of potential value in the establishment of the lost or undeveloped power of speech. In spite of this fact the literature on the subject is meager in the extreme. Bezold[5] observed that numerous and extensive auditory residua were found in one-third of the deaf-mutes, in an extensive series studied. He urged most strongly that methods of education should take due cognizance of the condition.

Sydney Scott[6] reports a series of cases and remarks, "among the fascinating phenomena observed in studying the significance of the hearing tests is the occurrence of tone gaps and tone islands in the auditory field".

In cases of hysterical deafness Weidner[7] in performing the Schwabach test, frequently observed islands of tone perception. In commenting on the general condition McKenzie[8] makes the further observation that the findings are not constant, and show marked individual permutation.

The present study reports the findings in the examination of a group of school children, known either to have lost their hearing from some form of meningitis or to have been congenital deaf-mutes. It may be said in passing that where the hysterical element can be

excluded, all other cases showing acoustic lacunae are probably referable to one of these two causes. In no case in the particular group studied had any middle ear complication intervened.

The children as a whole were bright, active, and interesting, and were uniformly anxious to assist in the study. At times this very co-operative spirit proved a hindrance, and due to this fact many of the examinations had to be repeated. In all, 62 cases of deafness were studied, the description of which can be presented most compactly in tabular form.

TABLE I—DISTRIBUTION OF CASES.

Designation	Meningeal			Congenital			Summary		
Sex	M	F	Total	M	F	Total	M	F	Total
With Lacunae									
Right Ear	1	0	1	2	0	2	3	0	3
Left Ear	3	4	7	1	1	2	4	5	9
Both Ears	1	1	2	0	0	0	1	1	2
Total	5	5	10	3	1	4	8	6	14
Without Lacunae	20	15	35	9	4	13	29	19	48
Cases Examined	25	20	45	12	5	17	37	25	62

With so small a number no sweeping generalization is warranted. It is interesting, perhaps, that while males predominate, in the group, the percentage of incidence of residua indicates no sex influence in their determination. Further, these observations do not sustain Hartmann's contention of a greater frequency in the congenitally deaf—the percentages again being substantially idenical.

During the study, certain refinements in technique were found to be essential. It is highly important that the hair should not be touched either by the tuning fork or by the examiner. In fact, to secure dependable results, no single part of the child under examination, nor any portion of the chair in which it sits, should be touched by the observer when making the several continuous tone tests with the Bezold forks. Apparently, the floor exercises no influence, although it would seem advisable that the observer wear rubber soled shoes. It is expedient, also, to blindfold the child during the examination, as when one sense is lacking or dulled for any reason, the other senses are distinctly more acute in their apprehension of changes in their surroundings. The room should be light and airy, but as nearly sound proof as may be encompassed. Finally, care should be exercised that the duration of the test is not too long, as a fatigue element may easily introduce unsuspected error. The results of the tests are collected in Table II.

The remains of hearing covered a wide anatomic range, and were entirely in diatonic order. No tone gaps were observed. Cases 3, 7, 9 and 10 apprehended an identical and circumscribed range of four half tones, the others all showed greater residua, but with no uniformity of position. Ten of the fourteen cases exhibited a superior limit at c^5, only one showed an island wholly above this boundary. With but two exceptions, all islands fell short of c^2. This is particularly significant as that part of the tone series important for the understanding of speech falls between these two limits.

TABLE II—DESCRIPTION OF CASES.

Etiology	Description			Deafness			
	Case No.	Sex	Age (yrs.)	Duration	Ear	Lacuna	Remarks
Meningeal	1	M	16	12	R	a^3-g^4	
	2	F	13	4	L	a^3-a^4	
	3	F	13	7	L	g^4-c^5	
	4	F	11	3	L	c^3-c^5	
	5	M	12	1	L	a^2-c^5	Bell
	6	M	14	5	R-L	c^4-c^5	
	7	M	11	5	L	g^4-c^5	
	8	F	13	2	L	c^5-g^6	Bell
	9	M	14	2	L	g^4-c^5	
	10	F	13	2	R-L	g^4-c^5	Bell left ear
Congenital	11	M	17		L	c^1-c^5	Vowels o and u
	12	F	12		L	g^3-c^5	
	13	M	17		R	a^4-c^6	
	14	M	16		R	g^1-c^5	

In determining the relations between the physical laws of sonorous vibrations and the aesthetic or emotional characteristics of auditory perceptions it is of particular interest to note, that the entire octave, i. e., the interval c^1-c^2, is divisible into more than 1200 tones which can be distinguished by the ear. The total number of single notes that can be perceived by the normal ear is thus very considerable.[9] But we know that in music the extreme perceptible tones, whether the highest or the lowest, are not utilized, so that the musical tone-range does not usually exceed seven octaves, commonly known as the contra-octave, great-octave, small-octave, once-, twice-, thrice-, and four-times accented octaves. It has been proven also that the less the aural acuteness and the feebler the tone, so much the greater must be the number of impulses which must summate in order to obtain complete perception.[10] The relationship of the lacunae to the speech area is shown most clearly in the accompanying diagram.

Since our ears are much more sensitive for sounds in the middle tone area than for those at either end of the scale, the important fact is that the tones of speech are entirely within this area.

Sound may be defined as a sensation which is the conscious appreciation of internal changes occurring in certain cells of the cerebral cortex. Fibres of the auditory nerve come into close relation with these cells, and in whatever way those fibres are excited, the end result is the same: namely, a sensation of sound.

Sounds have been divided arbitrarily into two classes: tones and noises. The former produce pleasant and the latter unpleasant (harsh, grating, screeching) sensations. Between these two extremes fall the sounds of every day life.

Since there are different qualities of the elements of the ear, we must refrain, at least in our practical examination, from comparing the quantities of sounds of different pitch with each other. We know that notes of different quality are produced by composite air waves of different forms. But waves differing in form may still produce notes of the same quality. Or, in other words, change of phase of the partial tones does not alter the quality of the note.

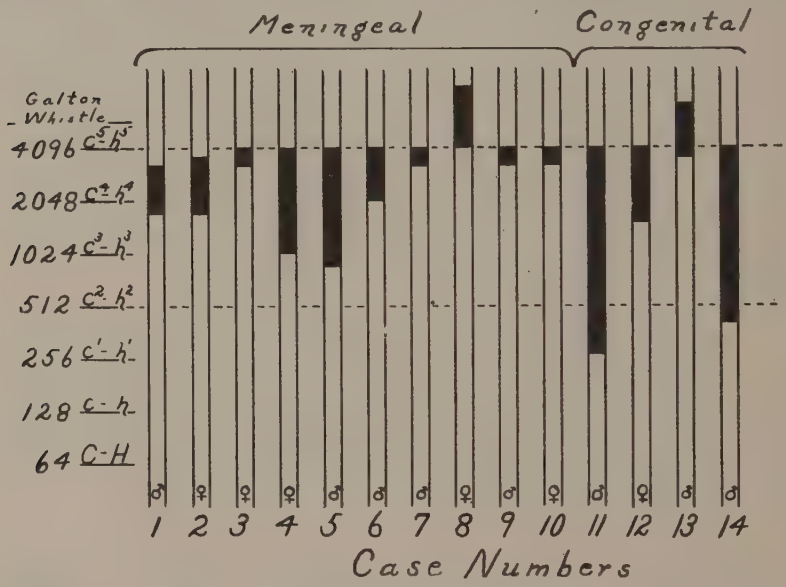
All uncomplicated diseases of the apparatus of perception interfere equally with hearing, by air and bone conduction, of sounds of any pitch. Daily experience confirms this supposition to such an extent that we always find a slight lessening of bone conduction in cases which hear speech badly, although they hear readily the lowest part of the tone scale.

It is an interesting fact that there is no known case wherein cerebral processes alone caused deaf-mutism. In meningitis, however, even where the clinical symptoms are often very slight, the effect on the labyrinth is most profound. Inflammation of the labyrinth nearly always involves both ears, while the cause of total deafness is always to be found in the internal ear.

The allocation of the lacunae as shown in the graph leaves it uncertain whether a group of sensations depends on the excitement of tactile nerves in the tympanic membrane, or on that of the auditory filaments in the internal ear. Such sensations, however, probably form an important moiety of the complex system of sensations which do not obtrude themselves on consciousness, but which nevertheless, bring information from the outer world[11] and have an intimate association with the more or less reflex movements that preserve the equilibrium of the body. It may be asserted also that the tympanic membrane is the peripheral organ of a pressure sense by which we become more or less accurately aware of the nature and position of surrounding objects, irrespective of the sensations of sight and hearing.

Starting from the fact that the basilar membrane splits readily in a radial direction, and is, moreover, tightly stretched between its at-

tachments, Helmholtz[12] proposed the theory that the basilar membrane behaves toward vibrations reaching it like a series of stretched strings. As the wires of a piano have different rates of vibration according to their length, and respond sympathetically to correspondingly different notes sounded in their neighborhood, so it has been supposed that different radial fibres of the basilar membrane are set into sympathetic vibration by different rates of vibration in the fluids bathing them. These vibrations must be imparted to the structures in the organ of Corti, and the irritation of the nerves connected with the cells of Corti is a natural sequel. The waves of physical sound are thus supposed to be analyzed in the peripheral sense organ, each auditory nerve fibre exciting in consciousness a tone of a particular



pitch, and the mind perceiving the simultaneous effects of different pendular vibrations as notes of different quality. This is the resonance theory. It may be mentioned that, though the canal of the bony cochlea as a whole diminishes in diameter from base to cupola: the canal of the membranous cochlea, the scala media, with its lower wall or basilar membrane, increases in diameter. Conjointly Kishi[13] states that in the first turn of the cochlea the membrana tectoria is not only less wide, but is tightly stretched, while in the apical turn, where it is more than three times as wide, it is loosely stretched. The radial fibres of the basilar membrane are longest near the apex of the cochlea.

I believe that the work of Ewald[14] and his theory of "acoustic images" more correctly explains these lacunae than does the reso-

nance theory. Ewald actually found that some of his artificial elastic membranes, of which certain portions were defective, showed lacunae in the series of stationary waves that arise when a tone is produced near them. Primarily, his theory is based, not on purely hypothetical considerations, but on a physical fact which can be experimentally established. His formula is, "That impulses aroused in the ear by sound impress a wave-image upon the basilar membrane to act as a link in the chain of the conducting apparatus, which is intermediary between the sound and the auditory sensation".

Hence the ear does not distinguish the different forms of waves in themselves, as the eye distinguishes the different colors. The ear must be said to decompose every wave into simple elements according to a definite law. It then receives a sensation from each of these simple elements as from an harmonious tone. By trained attention the ear is able to become conscious of each of these simple tones separately. And what the ear distinguishes as different qualities of tone are only different combinations of these simple sensations. The ear does not distinguish every different form of vibration, but only such as when resolved into pendular vibrations give different constituents.

This analysis of compound into simple pendular vibrations is an astonishing property of the ear. One must bear in mind that when we apply the term "compound" to the vibrations produced by a single musical instrument, the "compound" has no existence except for our auditory perceptions. In reality the motion of the particles of the air is not at all compound—it is quite simple, flowing from a single source. When we turn to external nature for an analogue of such an analysis of periodic into simple motions, we find only the phenomena of sympathetic vibration.

CONCLUSIONS:

The incidence of these lacunae with the area of voice production, bears directly on the problem. No curative treatment of such cases is known. From the practical standpoint, the problem becomes one of education. The accurate establishment of the scope of the remnants of hearing which are present in certain deaf-mutes, determines if their ears can be used for future instruction. Where such possibility exists, the children should be assigned to separate classes for instruction by means of hearing. And as the art of music is founded on the aesthetic or emotional side of acoustic perceptions, it should be the source or basis for instruction in deaf-mutes with "islands" of hearing. Music excites our emotions not only by melody, that is, the rhythmical succession of pleasing tones of varying duration, but

also by harmony, that is, the simultaneous emission of a number of tones, chords, and intervals. Every effort should be made to utilize these residual areas of hearing, if for no other reason than by daily practice to endeavor to improve the articulation of the pupil. This is especially true in young children of school age, because it is much more difficult to learn rhythmic articulation than the sign language. I believe that it is essential that these deaf-mutes first firmly establish the ability to use the larynx and the voice, then later on the signs which are useable and understandable for lectures and other meetings. Increased efficiency in instruction is an obvious corollary. The other children can be taught to understand speech only by observation of the mouth of the instructor.

While tones are distinguished in sensation by three factors—loudness, pitch, and quality—sometimes color and timbre, these sensations depend in turn on definite physical characters of air waves: their amplitude, or the extent of motion of the air molecules: their frequency, or rate of succession of the waves: their form, which is determined by the pitch and relative predominance of the upper partials combined with the fundamental tone.

The observations recorded above naturally give rise to certain speculations. In the light of our present knowledge of the hearing mechanism, much must still be left to conjecture.

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416 Marlborough Street.

CHRONIC PROGRESSIVE DEAFNESS TREATED WITH THE GALVANIC CURRENT.

Dr. M. L. Harris, Brooklyn, N. Y.

Chronic inflammation anywhere, as well as in the middle ear, will cause fibrous exudation, which becomes organized into new connective tissue. This goes on to contraction, leaving scars, with resulting impairment of function. In the middle ear the same process causes immobilization of the ossicles and drum, impairing conduction and secondarily hearing. This is the underlying pathology of chronic progressive deafness of non-central or nerve origin, where the drum remains intact.

The Eustachian tube is most often the starting point for the inflammatory changes. Where the underlying cause is disease of the nasopharynx, and the case reaches the otologist early, improvement and arrest of the process may be obtained by appropriate treatment. But those cases, with middle ear changes have been helped but little by our routine methods, and it is here that electro-therapy is of considerable benefit. The otologist has neglected this valuable therapeutic agent.

Malherbe in 1907 successfully applied the negative galvanic current by way of the Eustachian tube, with negative pole against the ear drum. In 1909 Dr. A. B. Duel, of New York, used this method for the removal of cicatricial obstruction of the Eustachian tube. In 1902 Albert Weill, a Frenchman, first used the negative galvanic current for the relief of tinnitus. He describes it in his book, "Manuel d' Electro Therapy".

Tousy in his book on electro-therapy quotes Yates, as using the static spark for deafness. S. St. John Wright in 1918 reports improvement from the use of the D'arsonval current or diathermy. It is the results from use of negative galvanism that I wish to report.

The theory underlying the action of the galvanic current is well established. The negative pole causes a hypermia, local elevation of temperature and softening with absorption of scar tissue. The positive pole has the opposite effect and will cause cicatrization. The negative pole is frequently used for softening superficial scars and the same effect should result in the middle ear, if we can reach it.

While my experience with the galvanic current for treating deafness is limited, the results are sufficiently encouraging to report. No-

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body who has treated these cases before has helped them, and the progressive deafness was not halted.

The method of application is simple. The external auditory canals are lightly packed with wicks of absorbent cotton moist with saline solution, to the drum, and the negative pole is applied biaurally to this cotton. The positive pole is applied by means of a copper spatula to the tongue and hard palate, good contact being obtained when the mouth is closed. The current is turned on gradually to the limit of tolerance, and in my experience, a current of 2 ma. should not be exceeded. The galvanic current is allowed to flow for 20 to 25 minutes, and then the sinusoidal for 5 minutes. This latter current increases the local metabolism and stimulates the muscles and nerves of the middle ear. Treatment is given every other day and bi-weekly tests are made to note the progress. Examination of the drums immediately after treatment shows the upper half markedly congested, and the patient will state that he has a very agreeable feeling of warmth in the ears. This warmth sometimes lasts for 24 hours.

Following are the cases so treated:

S. R., a merchant, age 45 years; progressive deafness for 12 years with severe tinnitus for the past few years, so that he could not sleep; no family history; never had any discharge from the ears; could not hear an auto horn. He had several intranasal operations and diathermy; also inflations and bougies in the Eustachian tubes. P.E. Drums moderately retracted, freely movable. Tubes open. Rinné negative, both bone and air conduction shortened.

Right ear	C_{64}	0	C 60	5	C_4 40	0 SV 12″
Left ear		0		18		6 6″

After 6 treatments he heard auto-horns—after 24 treatments hearing better, tinnitus only occasional, sleeps well, hears phonograph and his "upstairs neighbors fighting".

Aug. 24, after 24 treatments:

Right ear	C_{64}	8	C 60	18	C_4 40	6 SV 4 ft.
Left ear		5		13		6 20″

He is taking occasional treatments, and he claims it keeps him free of tinnitus.

Case 2: I. Z., married, female, age 24 years, 3 children; no deafness in family. Three years ago first noticed deafness with ringing in ears and a feeling of pressure in the external canals. Bougies passed into the Eustachian tubes, tonsils removed, without improvement. P.E. Dec. 16, 1922, drums almost normal, thin and pale, with that flamingo flush—no lateralization.

Right ear	C	5		C_4	+	
Left ear	60			40		
		3			+	

Air and bone conduction both shortened. Treatment began Apr. 30, 1923 (she had been in the country), receiving 11 treatments in all, when owing to an accident which laid her up, she could no longer come. However, the last time I saw her she stated that her tinnitus was less, giving *that* as the reason why she heard better. She could hear an automobile coming and the pressure feeling in the external canals was entirely gone.

Case 3: D. L., age 11 years, school boy; for five years moderate deafness of left ear—never any purulent discharge; tonsils removed; nose negative, pharynx granular. Ears: right slight retraction, left slightly retracted; both drums freely movable. Rinné positive.

Right ear	C_{64}	+	+C	55	C_4	35	Wh V	10″	Wt.	20″
Left ear	C_{64}	+	+60		40					
				45		15		10″		3″

After 12 treatments:

Right ear	C	60		C_4	40	Wh V	18″	Wt.	40″
Left ear	60			40					
		60			12		16″		18″

Hearing for both watch and forks was increased. He claimed he heard better.

Case 4: S., brother of a physician, age 44 years; typhoid twenty years ago with bilateral O.M.P.A. Ears dry for a long time, and deafness was progressive with slight tinnitus in spite of treatment with dilatations of tubes with bougies, and a submucous resection. Does not hear watch tick or telephone bell or door bell. R.D. lower central scar, retracted. L.D. small posterior central scar retracted. Nose congested, throat negative. Rinné negative. No lateralization.

Aug. 24, 1923:

Right ear	C_{64}		C	0	C	5″	15″	Wh.V.	0
		0		1		4			
				40		40			
Left ear		0		0		5″ SV	15″		0

After 15 treatments claimed to hear better. Oct. 6, hears telephone bell. Oct. 17, subways seem noisy to him now. Dec. 19, hears telephone bell four feet away.

After 30 treatments test shows:

Right ear	C_{64}	¼″	″C	½″	SV	5 ft.	Wh.V.	0
			1		+			
Left ear		1″	40	½″	+	6		1″

Case 5: Mrs. H., age 42 years, 6 children, all well; no family history of deafness. Three years ago first noticed deafness and marked tinnitus. Had the usual intranasal operations with inflations. Hears better in mountains. P.E.R.D. practically normal. L.D. slight retraction; both drums movable. Tonsils submerged; nose hyperthrophic rhinitis.

Right ear	C_{64}	0		C	0	C 4	15	Wh.V.	6″
Left ear		+		60	1″	40	20		12 ft.

Right Rinné negative, left Rinné negative.

After the first 7 treatments hearing is better. Tinnitus unchanged. After 15 treatments hearing is better. Tinnitus unchanged. She is going through her menopause and that may account for her tinnitus.

After 15 treatments:

C_{64}	½″	C 60	1″	Wh.V.	12″
	1″		3″		10 ft.

Case 6: Mr. M. G., age 30 years; deafness for 15 years, never any ear discharge, no family history; nasal obstruction operated several times, last operation six years ago. Inflations gave no improvement.

P.E. Pharynx congested, postnasal discharges. L.I.T. gone, large septal perforation. Ethmoids removed so that a probe is easily passed into the sphenoidal sinus. Both drums retracted.

Nov. 19, 1923:

Right ear	C_{64}	½″	C	3″	G_4	½″	Wh.V.	5″	SV	3 ft.
Left ear		1″		3″		1″		5″		20″

Drums slightly movable, prolonged lateralization to the right.

Dec. 21: After 15 treatments he hears better; hearing to the forks show improvement. He is positive that his hearing is better, and his relatives have noticed it. On testing him we find—

Jan. 9, 1924, after 20 treatments:

Right ear	C_{64}	4″	C	4″	C_4	15″	Wh.V.	10	SV	4 ft.
Left ear		4″		7″		20″		18		3 ft.

He hears spoken sounds further than this, but he seems to have difficulty in identifying them. He is still taking treatment.

Case 7: Mrs. F., age 36 years, married. Tinnitus for 6 years, progressive deafness for 4 years; no ear discharge; mother deaf. Diagnosed as otosclerosis by the best men in New York and had routine treatment.

Right ear	C_{64}	0	C_1	8—	14	C_4	+	Wh.V.	0	SV 2 ft.
Left ear		12	40	10			0		0	8″

Tubes open; pharynx and drums negative. Rinné negative.

After 15 treatments she does not hear better subjectively—noises at first less, now occasional.

Right ear	C_{64}	9	C_1	12	C_4	+	Wh.V.	0	SV	2 ft.
Left ear		10		40 18		0		1″		8″

Three cases that follow were treated by Dr. Mark J. Gottlieb, who was kind enough to try the method at my suggestion.

One patient, age 71 years, is a case of chronic adhesive otitis media following suppuration in both ears and has received inflation and other treatment over a long period. He was not improved by this and received no apparent help from a course of galvanic electric treatments. As a matter of fact, his tinnitus was aggravated.

The second patient, age 43 years, is a woman suffering with chronic catarrhal otitis media of a very severe grade, but did not complain of tinnitus. She has had a series of inflations given to her by some other doctor, without improvement. Her hearing has been markedly improved as a result of galvanic electric treatments combined with inflation.

The third patient, age 42 years, is a case of deafness of a very severe grade of the catarrhal type and she did not complain of tinnitus. Her case has been considered hopeless by a great many otologists and she was given X-ray treatment without effect. She has been markedly improved by galvanic electric treatments combined with inflation.

Another case treated by Dr. G. W. Miller, of New York, is a young lady, age 18 years, school teacher, with O.M.C.C. of the right ear, complaining of deafness and tinnitus. After 7 treatments, tinnitus is gone; can hear better over telephone. After 12 treatments her hearing is improved for watch from nothing to one inch, and C_{64} from 0 to 2 inches, whispered voice from 0 to 2 feet, and spoken voice from close to ear to 6 feet.

All these cases except two were chronic hyperplastic otitis media. The second and seventh were otosclerosis. One case of Dr. Gottlieb's was not benefitted. Their drums were movable, a few were flaccid, probably from repeated inflations. They all had patent Eustachian tubes. Previous treatment of the routine variety had done none of them any good, and they all showed improvements under the negative galvanic current, except the cases of otosclerosis. It is probable that early cases, before nerve deterioration sets in, so treated, might clear the middle ear of organized exudate and save patients from chronic progressive deafness.

1681 Union St.

SUPPOSED NOVOCAIN POISONING.*

Dr. Thos. J. Harris, New York.

This case is of especial interest from the possibility of its being a genuine case of novocain poisoning.

The patient came to the Post-Graduate Hospital at the morning clinic of Dr. Newcomb's service, for treatment of hypertrophied tonsils and deflected septum. A submucous resection was done under 4 per cent cocain and an injection of ¼ of 1 per cent novocain. There was no complication whatever in the operation and the patient was discharged at the proper time to return to have the work completed by the removal of the tonsils. This was done a month later. The technique was that followed at the hospital where every endeavor has been made to eliminate any chance for mistakes. The patient is a perfectly healthy man and had previously had cocain used in the nose with absolutely no complication following. It is a part of the routine procedure to use four syringefuls of ½ per cent novocain solution—not less than 4 nor more than 6 drams in all. Immediately after receiving this amount the patient was seized with very pronounced shock and prostration, rapid pulse and cyanosis, and was immediately transferred to the hospital. Stimulation, particularly strychnin, had the desired beneficial effect, and in 24 hours the patient was convalescent. At the end of 48 hours, the tonsillectomy which had to be put off, was done under general anesthesia without complications.

Dr. Emil Mayer, who is an authority, has stated that so far as he knows not one of the reported cases of novocain poisoning has been corroborated. They have all been due to some other causes.

Ths patient did not seem to have any susceptibility to it. In fact, Dr. Ross injected after the attack, a small quantity under the skin and there was no reaction; but the man did have a small quantity of cocain before the injection of four to six drams of novocain, with 6 minums of adrenalin to the ounce.

Great care has been taken at the Clinic that that amount should not be exceeded. The novocain was used during the submucous resection; and following that, when it was attempted to use it in the tonsil cocain applied locally before the injection of our to six drams of novocain, with 6 minums of adrenalin to the ounce.

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*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

SQUAMOUS-CELL CARCINOMA OF TONSIL.*

Dr. Martin Ross, New York.

Although carcinoma of the tonsil is considered a compartively rare disease, and sarcoma much more prevalent, still, a review of the literature of the last fifteen years does not corroborate this belief. This, however, may be due to the fact that, being considered rare, carcinoma is more frequently reported, whereas sarcoma less commonly.

Case report: W. H., male, age 53 years, a longshoreman by occupation, first came under observation Dec. 27, 1923, complaining of difficulty in nasal respiration.

Family history, negative. Both parents lived to a ripe age; no history of tuberculosis, syphilis or cancer.

Personal history: Patient has always been well and active, never within his memory having found it necessary to seek medical advice. No history of venereal disease.

Present illness: Dates back to six weeks prior to admission to clinic. At that time he noticed a very slight difficulty in nasal breathing, bilateral and constant. No discharge of any nature. At the same time he observed a similarly slight difficulty in swallowing. For several weeks he thought his condition due to a cold and treated himself accordingly.

On admission he did not complain of any pain or physical weakness, suffered no loss of weight, retained a healthy appetite and normal digestion. In other words, except for a slight impairment in nasal respiration and in swallowing, he had no complaint of any nature to offer.

Physical examination showed a robust individual, well-nourished, good color, but with breathing somewhat labored; mouth partially open. Pulse of good character, even, regular, 80 at rest. Respiration 22. His voice was somewhat muffled in character, although showing no tendency to hoarseness. Examination of his nose showed a deviated septum, non-obstructive, and a slightly dry condition of his nasal mucous membrane, with a tendency to crust formation. This, however, was not sufficient to cause appreciable obstruction.

Examination of his mouth showed a tonsillar mass bulging somewhat forward into the mouth, involving the soft-palate and displacing the uvula to opposite side. This mass presented a smooth, glossy

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

surface, pinkish red in color, with mucous membrane smoothly and tightly drawn over it. At the upper part of this growth, involving the anterior pillar, and the adjacent part of uvula, there appeared a very small area of ulceration, about ½ c.m. in size. This area was dirty gray in color, with smooth edges and a suggestion of a fungating surface. To the touch, the entire mass was firm with a marked area of infiltration shading imperceptibly into the tissues of the soft-palate. There was no bleeding or increased salivation. No involvement of the pharyngeal wall could be found. A view of the naso-pharynx and larynx could not be obtained. The glands at the angle of the jaw were palpable, but not appreciably enlarged.

A smear from the surface of the ulceration was negative for Vincent's. Blood Wassermann likewise negative.

On Dec. 29 a biopsy was taken in the region of the ulceration, with the following report:

"Specimen is very superficial. It shows a squamous epithelial lining which is regular and sharply defined from the stroma. In the stroma islands and strands of squamous cells can be seen which are in no connection with the lining epithelium. The composing cells are irregular and show differences in size and shape of the cells and of the nuclei. One mitotic figure and several very irregular nuclei are found. Some of the cells show necrosis. There is round cell infiltration of the stroma around these cells."

Diagnosis: Squamous-cell carcinoma.

The area of infiltration was so extensive that the case was deemed in an inoperable stage and accordingly referred for radium therapy.

On Jan. 15, 1924, 85 mg. and 2 10-mg. needles without screenage were imbedded in the tumor for 4 hours, a total of 240 mg. hours.

On Jan. 22, 1924, application of 4 25-mg. needles on a 1-inch block was made to the left side of the neck for 24 hours, a total of 2400 mg. hours.

On Jan. 24, 1924, the left tonsil appeared greatly swollen with a large slough on its surface and slight ulceration on the pharyngeal wall. There was a very marked enlargement of the cervical glands particularly on the side opposite to the growth. Breath very fetid.

On Jan. 29, 1924, the growth appeared distinctly smaller and softer; large ulceration on the surface of the tonsil with dirty grayish green slough. Ulceration on pharyngeal wall still present; cervical glands have receded greatly. Patient feels much improved, can breathe better through his nose and can swallow with much less difficulty, although at no time was this a prominent symptom. Breath remains very fetid. His appetite remains good, feels strong and has

easily maintained his body weight; he sleeps soundly at night. There is now present a slight pain at the left side of his throat, undoubtedly due to ulceration following radium therapy.

On Feb. 11, 1924, 3-12½mg., 2-10 mg., and 5-5 mg. needles, without screenage, were imbedded in left tonsil for four hours. The ulceration of tonsil has now spread to soft-palate, with the resulting production of a void. Voice has a nasal twang and patient is commencing to experience difficulty in swallowing fluids, which tend to regurgitate through nose.

Mar. 10, the void in soft-palate has increased markedly so that the left half of pharyngeal wall can be easily seen. There is increased difficulty in swallowing liquids and semi-solid foods. Glands at the angle of jaws are distinctly enlarged, but to what extent this is due to inflammatory reaction following radium therapy, is a matter of conjecture. There has been no loss of weight, and patient is in excellent physical condition.

On Mar. 13, 1924, a 4-25 mg. needles on ½ inch thick block were applied to left side of neck for 24 hours.

On Apr. 1, 1924, left half of soft-palate to a large extent sloughed off, as a result of radium. Margins of wound, however, are clean. No area of ulceration visible, although there is some infiltration of soft-palate still present. Glands still enlarged. One gland over ramus of right mandible distinctly painful.

On Apr. 10, 1924, 1-50 mg. tube on string was placed in nasopharynx for 16½ hours.

Apr. 15, 1924, there has been no change in patient's physical condition. He feels perfectly well, and except for the annoyance of regurgitation of fluids through nose, has no complaint to offer. He is, of course, still under treatment, and it is much too soon to pass comment on the ultimate result of this case. However, he shows distinct improvement and its future course will be a matter of interest.

Malignant involvement of the tonsil is principally a disease of the male, less than 20 per cent occurring in the female. Carcinoma seldom occurs below fifty, its average age of incidence being 56, while sarcoma may occur at any age, its average being 47. This really gives a false impression, as the age of the sarcomatous patient is commonly below 40, but the average is elevated by the presence of the disease in a few very much older patients. The age of the carcinomatous patient is less varying. In the differential diagnosis between carcinoma and sarcoma, much has been said of the lateness of the glandular involvement in the case of the latter. This is true of

sarcoma everywhere but in the tonsil. Glandular involvement may be just as marked and just as early an occurrence as in the case of carcinoma.

From simple hypertrophies, peritonsilar abscess, lupus, diphtheria, Vincent's and syphilis, malignant diseases can easily be differentiated by the history, inspection, palpation, blood test and biopsy.

In a review of the literature of malignant growths of the tonsil published since 1910, a series of 37 cases were obtained in which diagnosis was definitely established by microscopic examination. Clinical diagnosis alone was not accepted in this series. Of this number, 20 were carcinoma and 17 sarcoma. Of the 20 cases of carcinoma, no less than fifteen occurred on the left side, while one was bilateral, but more markedly involved on the left side, while only 4 cases were confined to the right tonsil. This gives an incidence of occurrence on the left side of 80 per cent.

Of the 17 cases of sarcoma, 11 occurred on the right side and 5 on the left, one bilateral case showing a greater degree of involvement on the right side. If this is true, and is substantiated by further reports, it not only is a point of interest, but may be of some diagnostic value in differentiating the two great groups of malignancy of the tonsil.

Of recent there has been some discussion as to whether epithelioma of the tonsil has its origin in the epithelium of the tonsil proper or its adjoining pillars.

Whenever epithelium normally or abnormally tends to change its type, such a change is more likely to produce epithelioma than the centre of an epithelial area. This is well shown in malignant disease of lips or anus, where carcinoma seems to have a predilection for the muco-cutaneous junction. This same factor may be applied to the tonsil, the favorite site, therefore, being at junction of the epithelial surface of tonsil and pillar. An established fact is, that, at the age when carcinoma is more prevalent, the tonsil, if any exists, has, regularly as we approach its center, a stabilized though proliferated epithelium covering it. Such activity and tendency to mutation as persists is chiefly at the periphery. There, also, it is more exposed to attrition and injury. For these reasons we would, a priori, expect a greater incidence of incipient cancer in this peripheral zone, whether in or just outside the tonsilar tissue proper.

From the statistics, it would be almost impossible to establish the validity of such an hypothesis, because the reports of cancer of the tonsil allude to more or less advanced disease which would preclude

the possibility of saying, even if it is already situated in the tonsil, whether or not it really began there.

Case	Sex	Age	Side	Type	Initial Complaint
1	M	57	Left	Carcinoma	Lump in neck
2	M	58	Left	Carcinoma	Pain
3	M	75	Left	Carcinoma	Sore throat
4	M	63	Left	Carcinoma	Pain on swallowing
5	M	54	Bilateral	Carcinoma	Pain on swallowing
6	M	35	Left	Round cell Sarcoma	Pain on swallowing
7	M	62	Left	Carcinoma	Sense of fulness in throat
8	F	65	Bilateral	Lympho-Sarcoma	Lump in neck
9	F	61	Right	Sarcoma	Lump in neck
10	M	48	Right	Epithelioma	Sore throat
11	M	62	Right	Round cell Sarcoma	Lump right side of throat
12	M	66	Left	Epithelioma	Sore throat
13	M	62	Right	Round cell Sarcoma	?
14	F	35	Right	Lympho-Sarcoma	Enlargement of right tonsil
15	M	67	Left	Carcinoma	?
16	M	53	Left	Carcinoma	Sore throat
17	M	64	Left	Epithelioma	?
18	F	66	Right	Carcinoma	?
19	M	37	Right	Sarcoma	Swelling of jaw
20	M	54	Left	Round cell Sarcoma	Swelling of jaw
21	M	47	Left	Epithelioma	Difficulty swallowing
22	M	31	Left	Sarcoma	?
23	M	65	Left	Epithelioma	Sore throat
24	M	31	?	Sarcoma	?
25	F	44	Both	Round cell Sarcoma	Sore throat
26	M	55	Right	Carcinoma	Sore throat
27	M	13	Right	Large round cell Sarcoma	Pain right ear
28	M	?	Right	Sarcoma	?
29	M	53	Left	Carcinoma	Difficulty breathing through nose
30	M	49	Right	Sarcoma	Pain on swallowing
31	F	13	Right	Round cell Sarcoma	Lump right side neck
32	F	26	Left	Spindle cell Sarcoma	Sore throat
33	M	56	Left	Epithelioma	Pain and difficulty swallowing
34	M	42	Right	Epithelioma	Pain swallowing
35	?	37	Right	Sarcoma	Lump in neck
36	M	67	Left	Epithelioma	?
37	M	38	Left	Round cell Sarcoma	Dyspnoea

As to treatment, surgery, diathermy, X-ray and radium all have their exponents. Each of these therapeutic measures undoubtedly has its own sphere of usefulness. A study of results in a great number of cases reveals the need for more heroic treatment. It is not uncommon to hear of cancer in other parts of the body seemingly cured. In the tonsil this is exceptionally rare. Death is almost the invariable result within two years. This being the case, the opponents of surgery score their most damaging point: if death is to ensue within two years, why subject the patient to the added burden of operation when radium will produce the same palliative result without any discomfort? The answer to this might be in the nature of a plea—a plea for earlier recognition of the disease. A cure can only be hoped for when the tumor mass has not extended beyond a point

where complete eradication is possible. If the case presents a diffuse infiltration with glandular involvement, complete extirpation is scarcely feasible. Surgery, except for mechanical relief in an emergency, is then not only of no advantage, but is distinctly contra-indicated. In those cases, however, where the growth appears localized, radical removal with resection of the glands of the neck and ligation of the external carotid artery and facial vein, followed by a course of radium treatment seems to hold out greatest hope.

In this connection the dangers of delayed diagnosis cannot be overemphasized. The time consumed in repeated blood examinations, therapeutic tests and observation of the progress of the case, often permits an operative case to reach the inoperative stage. Any unilateral enlargement of the tonsil in an adult should always be regarded with grave suspicion and treated that way until proven otherwise.

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302 East 18th Street.

REMOVAL OF STENSON'S DUCT FROM THE RIGHT ANTRUM BY PLASTIC METHODS, ETC.

DR. J. E. SHEEHAN, New York.

Mrs. M., age 60 years, was operated upon in December, 1922, for empyemia of the right antrum by the Caldwell-Luc method. Shortly after the operation, double mastoiditis and double lobar pneumonia developed, and the patient complained of a very annoying discharge from the nostrils, which was aggravated before and during meals. She sought relief from this condition unavailingly until last summer, when she was referred to Dr. Charles Imperatori, who determined

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

that the discharge was salivary in its nature and had resulted from an improper operation on the antrum. The Stenson's duct had been severed and had found its way into the antral scar, with resulting salivation through the nose. He referred the case to me to inquire whether by plastic methods, the condition could be relieved.

Operation.

I referred her to a dentist, who made a cup-shaped splint and attached it to her dental place, as her mouth was edentulous. To the centre of the splint was attached an upright semi-flexible piece of metal with three triangular wings to carry the stent. Over this we spread a Thiersch graft, which when inserted and left for ten days provided epithelial lining for the cheek and the area over and below the antrum. These healthy apposing surfaces maintaining natural separation, the duct was relieved of pressure, and the saliva encouraged to follow the natural route. The operation was performed Jan. 2, 1924, Dr. Charles Imperatori observing.

I incised the right gum along the course of the old incision and separated the cheek tissue from the scar covered antral wall, incidentally freeing Stenson's duct from the contractures.

A model of the raw area was made by inserting the sterile stent, made soft and pliable by immersion in hot water, in the newly-made cheek cavity, through the gingival incision. After the modelled stent was allowed to cool, a Thiersch graft was wrapped around it, raw surface uppermost. The skin-covered mould was attached to the prosthesis appliance attached to the dental plate in the cheek, per gingival incision.

The whole appliance was left in situ for ten days. Then upon inspection the cavity showed the formerly raw areas to be covered with an epithelial lining, greyish white in color.

Mar. 26, patient was discharged from the hospital as cured. She now salivated through the mouth and there was relief from the intractable headaches of which she had complained since the first antral operation.

There still remains an antral opening which may be closed by a flap from the palate, if the condition of the patient warrants the procedure.

24 East 48th St.

PLASTIC REPAIR OF THE SYPHILITIC NOSE.*

Dr. J. Eastman Sheehan, New York.

There are, broadly speaking, three classes of syphilitic nose disfigurements, which, for facility of reference will be referred to in numerical order, corresponding to the degree of destruction.

The first class: In the first class, the intranasal structure is intact, there is some loss of mucous membrane replaced by scar tissue and partial destruction of the cartilaginous bridge. This type is less frequent than the others. The loss of mucous membrane is not extensive, and is confined to the anterior superior quadrant. In this class of case it is not necessary, as a rule, to provide a lining. All that need be done is to implant chrondal cartilage, properly shapened to give support and overcome disfigurement.

The second class: In the second class, which is the commonest type, there is extensive destruction of the mucous membrane and usually of the intranasal structure and of the bony and cartilaginous bridge. No successful result can be achieved in the treatment of cases of this class unless a lining is provided. The proper lining is provided by grafting skin of the Thiersch order upon a supporting frame. If the grafting is successful, as is generally the case, it will change the appearance of the nose to that which results from a simple depressed fracture. Later, the appearance is improved by the implantation of chrondal cartilage.

The third class: Rhinoplasty. In the third class of syphilitic disfigurements there is destruction of the intranasal parts and total or partial loss of the skin covering, and rhinoplasty, more or less extensive, is the method of repair. The lining is obtained by swinging side skin flaps, properly designed, across the nose, and suturing them together.

The external covering is obtained from the forehead, scalp, upper chest, arm or abdomen, by the tube pedicle method. The skin from the forehead best matches the normal nose covering and the cosmetic result is best where it is used. In the repair of the syphilitic nose of this class, there is undoubtedly a greater risk of gangrene occurring in a flap, because the presence of syphilitic endarteritis interferes with the proper nourishment of the flap. Therefore, it is always advisable to have such cases cured of the disease before repair is attempted.

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*As given before the Brooklyn Eye and Ear Hospital.
*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

IMPLANTATION OF STENSON'S DUCT INTO THE ANTRUM FOR THE RELIEF OF DRY FETID CATARRH, WITH AN EPITOME OF THE OPERATIVE TREATMENT OF OZENA.*

Dr. J. Eastman Sheehan, New York City.

Mrs. Mary F., age 23 years, married, no children.

Since the ninth year of life the patient had been complaining of headaches of a general type. She habitually expressed large quantities of scabs from her nose, accompanied by very offensive odor. There had been much bleeding at times. She also complained of dizziness of a circular nature on bending forward, with a general tired feeling and inability to perform much household work. She also miscarried on three occasions.

Two years ago she entered the Clinic of the Post-Graduate Hospital for the relief of these distressing and uncomfortable symptoms. She was treated for some time with topical applications of various drugs in solution, also by lavage, packing, ovarian extract, tonics and fresh air, with only temporary improvement.

She again applied for admission to the Post-Graduate Hospital Clinic this year, and after a short treatment without effect I advised her to submit to a surgical procedure. Examination disclosed the formation of crusts, which were extensive, very adherent, and which, upon removal, would leave a bleeding surface. There was also atrophy of the turbinal bones and membranes of the whole intranasal parts. As the disease was more marked on the right side than on the left, I decided to implant Stenson's duct into the right antrum. The salivary discharge from which washes both sides of the nose, the excess passing out through the mouth. The operation was performed by me, Feb. 4, 1924, under local anesthesia. She went through rather a stormy post-operative period, complicated by miscarriage and mastitis, both of which conditions necessitated further surgical interference.

At present, all her symptoms have passed and inspection of the intranasal parts shows the absence of crust formation or bleeding areas, with a marked regeneration of the mucous membrane. The headaches have disappeared.

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*Case presented before the New York Academy of Medicine. Wednesday evening. March 26, 1924.

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

It is not within the range of this paper to ferret out the probable cause of ozena, but to bring to your attention advances made within the last few years through several ingenious operations designed for the relief of dry, fetid catarrh.

THE WITTMAACK OPERATION, WITH THE AUTHOR'S MODIFICATION.

The attempt to afford relief and to prevent crust formation, fetor and headaches by narrowing the nasal chambers and continuous cleansing of the nasal chambers is typified in the Wittmaack procedure. Wittmaack conceived the idea that if the nose could be kept clean, as the mouth is, by means of secretions pouring into it, the prevention of crusts and fetor would be a fait accompli. He therefore devised his operation to implant Stenson's duct into the antrum, since, with this accomplished, patients would salivate through the nose and the nasal chambers, periodically flushed with saliva, would be kept clean.

Operation: The antrum is opened according to the method of Caldwell-Luc. Stenson's duct is freely dissected from its bed with a wide area of mucous membrane around the ampulla. The duct is dissected in such a way that when it is fixed to the mucous membrane of the middle meatus of the nose, there shall be no tension.

While it is true that the constant flow of saliva does prevent the formation of crusts and fetor and alleviate headaches, it may also prove that the flow of saliva through the nose is an occasion of great annoyance to the patient. With this in view, and to provide that the excess of saliva over what is required in the nose shall flow into the mouth, the author has introduced a modification of the Wittmaack method.

After the duct is properly stitched in its new bed, the mucous membranes of the gingival and labial flaps anteriorly are sewn upon themselves. This gives the oposing surfaces an unrawed area which eventually results in an antral sinus. The salivary excess now reaches the mouth through the newly made antral sinus. If the flow of saliva still proves a great inconvenience to the patient, the production of the supply can be greatly curtailed by several applications of X-ray to the parotid gland, the effect of which is to lessen the activity of the gland, and therefore to restrict the production of saliva.

LAUTENSCHLAGER'S OPERATION.

Lautenschläger states that there are microscopic changes of a pathologic nature in the mucous membranes and bony walls of the antra and ethmoids. As a result of these changes, he insists these cavities should be dealt with and laid open. He is supported in his views by Rundstrom.

Operation: This consists in displacing the outer nasal wall inwards. Through the canine fossa the antrum is exposed and the mucous membrane removed. The mucous membrane of the nose is separated from the nasal wall and along the nasal floor. The nasal wall is separated by chiseling first through the canine fossa backwards along the floor of the antrum; then a second chiseling process is carried out, beginning below the attachment of the inferior turbinal. That part of the nasal lateral wall is now completely separated and is pushed inwards and downwards until it approaches the floor of the nose. The membranes of the septum and turbinals are scarified to promote adhesions between these parts. In case the middle meatus is too roomy, this can be narrowed by pushing the middle meatal wall inward.

The antrum is now packed with strips of iodoform gauze quite tightly, to make the outer nasal wall secure in its new position.

The packing remains several weeks. To overcome suppuration and odor as a result of leaving the packing this length of time, I am now using modeled stent, which is removed after two weeks. This not only prevents suppuration and odor, but the bones are more securely held in their new place.

The mouth wound is closed with horsehair sutures, after the removal of the stent. Wittmaack's operation can be combined with this one of Lautenschläger's, and, with the author's modification of these two operations, most pleasing results can be obtained.

LAUTENSCHLAGER-HALLE OPERATION.

Halle modified Lautenschläger's operation in that all manipulations are carried out intranasally. The whole outer wall of the nose is displaced inwards. Halle incises the mucous membrane anteriorly to the middle turbinate and extends the incision downwards in front of the inferior turbinate, then forward along the floor of the nose to the septum. The mucous membrane is thus completely separated from the bone. The anterior nasal wall is cut with a chisel in a vertical line and then chiseled backwards on a horizontal plane, at the upper and lower ends of the incision.

The nasal wall is now forcibly pushed inwards, using a strong, flat chisel. The mucous membrane of the septum and turbinal regions are freshened to promote adhesions. If the antra are diseased, this can be dealt with. Packing, tightly inserted, is removed after five days. Halle states the results are as good as with the Lautenschläger operation, with less pain, with less discomfort to the patient because of the shorter duration of the packing, and generally less exacting after-treatment.

HINSBERG OPERATION.

This has to do with the narrowing of the nasal chambers. Hinsberg is an adherent of those who emphasize the importance of the mechanical factor. The antra are opened through the canine fossae; two incisions are made through the bone of the inner nasal antral wall, the lower incision being brought through the pyriform fossa and extended backward to the posterior walls of the antra. The upper incision separates the nasal process of the maxilla. The separated bone is forcibly pressed inwards and held in its new position with wire. A very strong needle, carrying wire, is passed from one antrum to the other. To the end of the wire is attached a metal disc emplaced over the antrum. Tension is now exerted upon the wire, and a second disc is placed at the other end of the wire and secured in place by clamping a lead bead firmly on it. The tissue reaction is apt to be quite severe, but the author states it quite subsides within ten days to a fortnight. The plates are removed after ten weeks. This method is known as the "Platten-Naht of Hinsberg".

Narrowing the nasal chamber by insinuating various substances under the mucous membrane of the floor of the nose and nasal septum has also been essayed. Moure, in 1902, used paraffin with a melting point of 45° C. with some success. Vaseline, with and without baryta, has been used. Freshly drawn blood taken from a vein and injected beneath the mucous membrane or periosteum of the septum, floor of the nose and turbinals, has its advocates.

Implantations of bone and cartilage have been widely used, but as bone grafts do not always take, costal cartilage has of late been more extensively favored because it can be depended upon to "take".

The ideal operation for ozena has not yet been evolved, but the concensus of opinion of workers is that to obtain the best results surgically, the nose should be narrowed, especially the lower meatus, and the mucous membrane be kept clean. Many operators advise that the milder cases should also be dealt with surgically.

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HEMORRHAGE FOLLOWING ETHMOID AND OTHER SINUS OPEPRATIONS.*

Dr. Samuel Kulkin, New York.

Report of a Fatal Operative Case Showing Developmental Absence of the Outer Sphenoidal Wall, etc. F. F. Emerson, The Laryngoscope, 19:43, 1909.

A school teacher, age 21 years, had suffered from "catarrh" since childhood, examination showing a tenacious mass covering the entire surface of the pharyngeal vault, and a bullet-pointed probe revealing a carious area in the sphenoid.

July 5, 1904, the right anterior sphenoidal wall was removed with Gruenwald forceps, together with the anterior end of the right middle turbinate. On Apr. 15, 1905, the anterior sphenoidal wall on the left was removed, together with the anterior end of the left middle turbinate; and the carious area on the floor and inner wall curetted.

Nov. 17, 1906, the patient returned complaining of a return of symptoms. A large cell filled with pus was found in the remains of the left middle turbinate, which was opened and drained. May 25, 1907, the thin tenacious grayish coating was found to be still present over the pharyngeal vault. A thorough examination was now made and in the right sphenoid a carious area was felt on the outer walls, with a soft mass posteriorly. This was taken to be polypoid and but little force was used in probing for fear of exciting hemorrhage. A curette was introduced and turned toward the outer wall, and on its withdrawal there was a profuse venous hemorrhage and a convulsion. The patient immediately became unconscious and died in seven hours.

At autopsy a hemorrhagic clot filled the calvarium. A large varicose vein was found to occupy a dehiscence in the outer wall of the right sphenoid, which communicated directly with the cavernous sinus, and was the cause of death. The remaining ethmoid cells were everywhere necrotic, and about a half ounce of mucopurulent secretion was found.

Transactions of the Section on Laryngology, Otology and Rhinology of the A. M. A. 1916. (Symposium on Sinus Disease).

George E. Shambaugh: *Surgery of the Ethmoid Labyrinth* (p. 85). "As regards after-treatment, most of the cases require no special treatment . . . . require no tampon if the patient remains at the hos-

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

pital where directions can be left for the introduction of a tampon in case secondary bleeding requires it. Occasionally one meets with severe bleeding at the time of the operation which may require the immediate introduction of a tampon. This should always be removed not later than the following day."

Ross Hall Skillern: *Sphenoid Sinus* (p. 109). "The sharp hook .... is of great value, particularly where judiciously applied, as it is always working away from points of danger. The only possibility is a sudden breaking in with injury to the lateral sinus wall and the dangerous or even fatal hemorrhage that will surely follow."

"*Hemorrhage.* Under ordinary circumstances the bleeding met with during and after operation is trivial, provided one does not go down too deep into the sinus floor. The source of dangerous hemorrhages while opening the sinus is the sphenoidal branch of the nasopalatine which traverses its floor. After the sinus is opened, the cavernous sinus lying laterally is to be avoided, as two cases of accidental injury to these veins during curettement have been reported. One was fortunately controlled by tampons, but the other resulted fatally." (See Emerson abstract.)

"Post-operative hemorrhage has been known to occur as late as the fifteenth day (see Myles abstract); five cases also have been reported as occurring on the seventh to tenth, one of which required ligation of the external carotid. As far as tampons are concerned they had best be omitted entirely. The sinus will drain better without them and it is now the concensus of opinion that to promote healing they are without value and may even exert deleterious influences. Only for the purpose of controlling hemorrhage should they be placed in the sphenoid sinus."

Trephining and Curettage of Sphenoidal Sinus; Profuse Secondary Hemorrhage Requiring Litigation of the External Carotid Artery. Robert C. Myles, The Laryngoscope, 13:293, 1903.

The patient was presented before the Section on Laryngology and Rhinology of the New York Academy of Medicine. He had suffered from general sinusitis associated with atrophic rhinitis. The right ethmoid cells had done well under operation, there was a necrotic area and perforation in the left sphenoidal wall—a copious discharge of more or less putrid mucopurulent matter—issued constantly from the cell. The trephine and curette were used on Jan. 1 to enlarge the opening, and on Jan. 9 there was a very alarming hemorrhage, which in the surgeon's presence recurred several times. The hemorrhage was so profuse that the patient lost about a pint and a

half of blood in three minutes. The wound was promptly and vigorously packed, and the patient removed to the hospital, but on removing the packing two days later the hemorrhage recurred. As the patient was nearly exsanguinated, the external carotid was ligated under cocain anesthesia. Catgut was placed around the common carotid for 24 hours and the external carotid tied because it was uncertain whether or not necrosis had occurred on the lateral wall, and that hemorrhage was taking place from the internal carotid. It was hard to realize that so much blood could come from the terminal branches of the internal maxillary artery in such a short time. Hemophilic symptoms appeared for several days in the mucosa of both sides, which required tamponage. The patient at the time of the report was making decided improvement in a local and constitutional sense.

Malignant Hypernephroma of the Ethmoidal Region. H. Arrowsmith, The Laryngoscope, 26:909, 1916.

The author was absent from his service when the patient, a negro, age 56 years, was admitted, and in his absence, his assistant removed from the patient's left nostril what appeared to be a polyp, using a cold snare. Profuse hemorrhage, necessitating tamponing immediately followed, but a few days later the patient was allowed to go home. As microscopic examination of the tumor suggested hypernephroma the author sent for the patient, and on his return to the hospital he was continually subject to profuse nose-bleeds, which diminished his hemoglobin to 30, from which point it would slowly rise until reduced by another hemorrhage. Rhinoscopic examination revealed a mass in the left nostril which the author exposed by a lateral rhinostomy after Moure's method and removed a friable yellow mass which had involved and destroyed the entire left ethmoid region, and the inner wall of the orbit. Bleeding was very free, despite preliminary ligation of the external carotid, and the patient, who had already lost so much blood, died three hours after operation.

Normal Horse-Serum in Hemorrhages from Nose and Throat Operations. C. F. Theisen and N. K. Fromm. *N. Y. Med. Jour.*, 100:875, 1914.

In the cases here reported serum injections were given irrespective of the coagulation time when, from a history of severe hemorrhage in the patient's family, or severe spontaneous hemorrhage in the patient, an unusual amount of bleeding after operation, was to be expected. Case 7, a farmer's son, though strong looking, had a very slow coagulation time and gave a history of severe nasal hemorrhages

and excessive bleeding when teeth had been extracted. There was also a hemorrhagic family tendency. Chronic ethmoiditis for years with severe periodical headache on same side. Fifteen c.c. of serum were injected 17 hours before tonsillectomy, middle turbinectomy and curettage of anterior ethmoid cells. "There was practically no bleeding during the tonsillectomy, nor afterward. In the ethmoid operation, which is usually attended by profuse bleeding, there was also very slight loss of blood. No nasal tampons were used."

Case of Intranasal Ethmoid Exenteration Accompanied by Uncontrollable Hemorrhage; Death. Dunbar Roy, *Ann. Otol., Rhinol. and Laryngol.*, 30:922, 1821.

A boy, age 18 years, a strong, robust country lad, presented a suppurating ethmoiditis with numerous polypi. No blood examination was made, and the day after examination an intranasal exenteration was performed on the left side. The whole ethmoid region was polypoid and soft, requiring the use of the snare, curette and cutting forcepts. A good opening was also made through the naso-frontal duct and the frontal sinus thoroughly irrigated. The sphenoid was also opened, because it was very soft and a curette easily entered the antrum. No packing was used and there was no undue amount of hemorrhage. Discharged the third day.

Four months later the patient returned for examination. The left side was "in excellent shape" but there was headache and profuse purulent discharge on the right. This side was operated the next day in the same manner as the previous intervention, and all went well until the fourth day, when there was hemorrhage from the right side, which was checked without using a tampon. Two days later, late in the evening, profuse hemorrhage set in and the patient being brought to the hospital by ambulance, both sides were packed tightly with sterile gauze. He was given horse-serum, and morphin and atropin, and these measures seemed to control the hemorrhage; at 9 the next morning only slight serous oozing was present. The condition, however, became progressively worse and eight days after operation the bleeding recommenced despite all precautions. The next day the common carotid was ligated, after which active bleeding ceased, but the condition was still grave. Seven days after litigation bleeding began from the neck incision, though there was none from the nose and throat. That evening it was decided to try to stop the bleeding surgically, to which end the patient was taken to the operating room and gas ether anesthesia given. Respiration ceased almost immediately and all efforts at resuscitation failed. No autopsy was permitted, but when the wound was opened on the operating table,

all the neck muscles and fascia were found undermined, and an immense cavity filled with clotted blood revealed, extending even as far as the chin. The suture on the carotid was firm and there was complete ligation.

The author states that like many others he had operated upon a number of cases where the hemorrhage was very severe, but none where surgical ingenuity was so taxed as in this one. "Knowing that the posterior ethmoid cells derived their arterial supply from the spheno-palatine, a branch of the internal maxillary, from the external carotid and from the ethmoidal branches of the ophthalmic artery, a branch from the internal carotid, we felt assured that the tying of the common artery would take care of all the hemorrhage on the left side. This proved correct, as all bleeding ceased from the nasal cavity and all tampons were removed. But why the hemorrhage should start from the wound in the neck, and this also be so uncontrollable, is a question difficult to answer. . . . Evidently a slow bacteremia had been progressing for some time, due to the absorption for years of pus from the ethmoid cells, and this had undermined the coats of the blood vessels as well as the integrity of other body tissues . . . these extreme cases of necrosing ethmoiditis are not without their dangers."

Harold Hays, describing "a simple, bloodless and painless operation for the complete exenteration of the ethmoid labyrinth" (THE LARYNGOSCOPE, 31:186, 1921), says: "Never having been able to perform a satisfactory operation on the ethmoid labyrinth, either by the Ballenger method or the Mosher method, or any of the other methods described, chiefly because the instruments were not applicable to every case and *because of the profuse hemorrhage*, I finally worked out the simple operation which I am about to describe, which is both painless and bloodless."

FATALITIES FOLLOWING OPERATIONS UPON THE NOSE AND THROAT NOT DEPENDENT UPON ANESTHESIA. H. W. Loeb, *Ann. Otol., Rhinol. and Laryngol.*, 31:273, June, 1922.

Under the sub-heading "Hemorrhage" a table is given of fatalities from this cause occuring in different nose and throat operations. *Sinus operation* is credited with four. These are further tabulated as "hemorrhage resulted in death following puncture of the maxillary sinus, the bleeding being from both the gums and nose. A resection of the naso-maxillary wall came to a fatal issue by reason of hemorrhage; another death after removal of polypi, and still another after ethmoid exenteration. In none of these cases was there anything to anticipate a fatal hemorrhage."

This paper is based upon 332 fatalities which the author collected (apparently by a questionaire). No references are given, nor the names of the surgeons in whose practice the fatality occurred.

In discussion of this paper, Dr. Harris P. Mosher, of Boston, said: "The public has been trained to think the sphenoid operation dangerous" but "a mistake had been made in allowing house officers to think they understand the ethmoid." He was accustomed to address his post-graduate class in some such terms as this: "Gentlemen, if I ever succeed in putting the fear of God into you, in regard to the ethmoid, I have not lived in vain." It would be well to spread all over the country a more sensitive surgical conscience in regard to operations on the nose and throat."

Information on this subject is very meager indeed. Examination of recent text-books—for example, Skillern (4th ed., 1923) and Phillips, most recent edition (1922) reveals no mention even of the possibility of postoperative hemorrhage in ethmoidal or sphenoidal operations. Coakley (6th ed., 1922) says: "If hemorrhage is so profuse as to obscure the field from view, the operator should invariably refrain from proceeding until he can control the bleeding and see exactly what is being accomplished at each step of the operation. If this cannot be accomplished, one should stop the operation and complete it at a later date, making it a two or three stage operation if necessary."

HEMIPLEGIA FOLLOWING SUBMUCOUS RESECTION OF THE SEPTUM.*

DR. MORRIS ROSENTHAL, New York.

Mrs. I. K., age 45 years, housewife. Came to the Clinic Feb. 9, 1924. Complaint: Frontal headaches, duration 6 months with remissions, dryness in the nose.

Previous history: Has two children living. Four children died at or within a week of birth. During the time of pregnancy of children living, patient was receiving anti-syphilitic treatment. Has had an aortic regurgitant murmur for the last ten years. For the last two months has had loss of feeling in right hand and at times things would drop out of her hands.

Examination: Deviated septum S-shaped, hyp. middle turbinate left, no pus in the nose, pharynx dry, transillumination negative, X-ray of sinuses shows insufficient evidence of pathological change.

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

Operation: Feb. 19, nose packed with 4 per cent cocain containing a few minums of adrenalin, incision made on the right side. Perpendicular plate extremely thick, removed with heavy biting forceps. Nose packed with sterile vaselin gauze, one strip on each side. Patient kept in clinic three hours and sent home. No unusual bleeding after reaching home but patient complained of pain in left temporal region. Same evening husband thought he noticed a slight thickening of speech. Next morning patient came to Clinic, packing removed by houseman, no unusual symptoms noted. That same evening patient unable to speak and right hand paralyzed. Patient sent to Israel Zion Hospital, from which she was discharged on Mar. 11, twenty days after date of operation with condition almost entirely cleared up. Patient seen three days ago, condition still further improved, hardly any difficulty of speech and almost complete restoration of use of right hand.

The findings: Neurological, blood and background on admission to hospital were as follows: Patient conscious, understands spoken language, no nystagmus, right facial present, no ptosis of lids, pupils dilated, tongue is not deviated, no fifth nerve or other cranial nerve involvements. Right upper extremity shows mild paretic condition, no exaggerated reflexes. Knee jerks present, but not exaggerated. Babinski and Oppenheim present. Motor power of right lower extremity intact. Speech shows some involvement of center. The impression at this time was that the patient had a hemiplegia of the right cortical area.

Eye examination showed fundi vessels somewhat sclerotic. Blood chemistry: glucose 87, urea nitrogen 13.6. Blood, Wassermann negative. Spinal fluid: under pressure, giving positive reactions to albumin, globulin and copper with 8 cells per c.c.m. and a negative Wassermann.

Since the writing of the above report, the patient has had several attacks of hemiplegia, some of them resembling brain abscesses, with marked exophthalmous, choked disc, and in the last attack, there was a more complete paralysis of the sphincters. She has not recovered.

324 E. 18 Street.

HODGKIN'S DISEASE OF NOSE.*

Dr. Thos. J. Harris, New York.

M.M., age 13 years, presented herself at the Clinic Nov. 17, 1923, with the following history:

She is a native of Russia, three years in this country. She has one brother and two sisters considerably older than she. All of them are well. Never had had any serious illness. Before coming to this country had some trouble with one ear but with no discharge. Two years ago her tonsils were removed. This was followed immediately by the swelling of the glands of the neck on the right side. For this she came to the Pediatric Clinic of the Post-Graduate in June, 1923. The diagnosis was made of tubercular adenitis and she was referred to the Radium Department for treatment. She received at intervals of about three weeks three applications of radium, 5-20 mg. to the area over the gland, with the result that the swelling disappeared. At about the same time a redness and swelling of the right lower eyelid was noticed with discharge of pus from the lacrymal duct of the same side. Two months before being seen in the Throat Clinic, patient began to complain of difficulty in breathing through right side of the nose. There were frequent frontal headaches. A month later acute pain developed in the right ear, followed by a purulent discharge. The patient is a well nourished girl and with the exception of the nasal condition apparently in good health. Menstruation began ten months ago. She is a mouth breather, all air through the nose being shut off. The face shows some broadening, but there is no pronounced asymmetry. Examination of throat negative. Examination of nose discloses an irregular mass obstructing the right nostril, bleeding easily on touch. There is a marked deflection of the septum to the left. Transillumination shows darkness over right antrum. X-ray of sinuses shows pronounced cloudiness of right antrum and ethmoid. Wassermann was negative, also chest. A diagnosis of sarcoma of the nose was made. Dec. 4 an exploratory opening of the right antrum through the canine fossa was made under local anesthesia. No pathologic condition was discovered. At the same time a section was removed from the nose for examination. The laboratory report was granuloma, probably lympho-granuloma. Two weeks later an attempt was made under local anesthesia to remove the intranasal growth. This was not successful on account of

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profuse bleeding and the unruliness of the patient. On Jan. 3, under general anesthesia the growth from the right side was removed as fully as possible, a free connection being established with the nasopharynx. An attempt at the same time was made to correct the septal deformity but this had to be abandoned on account of the excessive bleeding. The posterior portion of the septum was found to be lacking. The nasopharynx upon digital examination showed a small amount of new growth in the vault, which was removed. This was included with the rest of the tissue submitted to the laboratory for examination, but was not specifically designated so it is impossible to report definitely upon its nature. The laboratory report, which confirmed the previous examination in every particular is as follows:

The surfaces of the specimen show necrotic leucocytes and fibrin and is infiltrated by blood. Specimen is composed in the deeper parts of a stroma heavily infiltrated by lymphocytes and polynuclear leucocytes, among which a few sosinophiles and basophiles can be recognized and large monoculear wandering cells. This granulation tissue is well defined from a piece of cartilage which is found at the base. A few mucous glands can still be recognized. Only here and there an arrangement of the lymphocytes around blood vessels in large or small follicles can be recognized. The lining epithelium cannot be found. In certain areas the connective tissue stroma is dense. The histological picture is quite uncharacteristic. Stains for bacteria, particularly tuberculosis, were negative.

Diagnosis: Granuloma.

Examination of blood negative.

She was seen then in consultation with a doctor of the Department of Internal Medicine, who made a diagnosis of Hodgkin's disease. On Jan. 28, patient was referred to X-ray Department, where she received one external application of X-ray and another on Feb. 28. Provocative Wassermann was negative. In spite of this she received inunctions from Jan. 13 until recently. At same time she took internally, iodid of potash in increasing doses. Dr. Cohen, from the Eye Clinic, also saw the case and made diagnosis of infection of the lacrymal duct, advising resection as soon as the acute stage is over. At this time, Mar. 26, the condition in the nose remains about the same: Anteriorally no return of the growth. There is still, however, a complete obstruction which proceeds largely from the septal side. The ear has stopped discharging. The patient's hearing is normal. She continues in good health, weight apparently normal.

Comment: Involvement of glands of the neck is a characteristic symptom of lymphogranuloma. Numerous cases are on record where

enlargement of the tonsils have been found to be a symptom of the disease. A careful search however of the literature does not reveal any cases where the growth has been found in the nose. Clinically the case has many characteristics of sarcoma but in the light of the history of the gland swelling in the neck and of the laboratory findings together with the general physical symptoms there would appear to be no other conclusion that the case must be a unique nasal manifestation of lymphogranuloma. The favorable response to radiation of growth of this nature is well known and it is hoped that as favorable a result will take place in the nose as took place in the neck. The case will be kept under observation and presented at a later meeting of the Section.

HEMORRHAGE FOLLOWING ETHMOIDECTOMY.*

DR. SAMUEL KULKIN, New York.

M. T., age 40 years, born in Russia. Family history negative. Provisional diagnosis: Admitted to the Post-Graduate Hospital on service of Dr. Harris, with a diagnosis of bilateral ethmoiditis with polypoid degeneration of both middle turbinates.

History: Complained of difficulty in breathing, continuous "colds in the head" for last two years, headaches frontal in character and a postnasal discharge. Coagulation time by capillary tube 5½ min.

First operation: Was performed on Nov. 1, 1923, under 10 per cent cocain anesthesia with adrenalin. The radical Mosher operation on the left ethmoid was done, agernasi cell opened with chisel, the ethmoid cells exenterated from before backwards with curette, and debris and remainder of middle turbinate removed, with punch forceps. Operating time 15 minutes.

Second operation: On Nov. 3, 1923, a similar operation was performed on the right side. On the following day irrigation of both sides with normal salin solution was ordered. Patient was discharged on Nov. 6, 1923, apparently well.

Nov. 7, 1923: At 11 a. m. patient returned to the hospital with a history of bleeding from the left nostril for the last hour. Left side of nose was immediately packed with vaseline gauze by the house surgeon. The bleeding stopped. At 12 o'clock patient again began

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to bleed slightly through the gauze packing. The same night patient had a chill lasting 30 minutes.

Nov. 8, 1923: At 10:30 a. m. the packing was removed, the bleeding area cocainized and repacked and 2 c.c. of fibrogen given subcutaneously and in about 2 hours the bleeding apparently was checked. On the following day he again began to bleed. The packing was changed and bleeding checked. The packing seemed to check the bleeding only slightly and for a compartively short time.

Nov. 12, 1923: 30 c.c. of blood was given intermuscularly and ¼ gr. of morphin given by hypo, and towards evening of that same day the bleeding again seemed apparently checked. Patient complained of cold sweats and weakness.

Nov. 13, 1923: Patient had a severe hemorrhage. He lost about 6 ounces of blood. The postnasal plug was reapplied. During this entire period the patient was getting 20 grains of calcium lactate t.i.d.

Nov. 15: The patient had another severe hemorrhage through the packing.

Nov. 16: At 9 p. m. still another hemorrhage, the packing was changed and the Murphy drip instituted. The patient became weak, pulse was rapid, but no volume, and the temperature went up to 103° F., and he was unable to take nourishment.

Nov. 17: A blood transfusion of 450 c.c. was given by Dr. Unger. The bleeding stopped and the patient showed slight improvement in his general condition. But on the following day he again began to bleed.

Nov. 20: He was taken to the operating room, packing removed, area cocainized on left side and nose firmly packed, and the bleeding stopped. Patient did not bleed for 2 days. The packing was then removed and patient discharged on Dec. 1, 1923, in good physical condition, but weak and anemic. He was sent to a farm for four weeks and when he reported to me (one month later) he was entirely well. Nasal condition was normal. His only complaint was dizziness at times; from which condition he suffered even before the operation.

Pathological and laboratory examination: Urine exam., Nov. 10, neg. Blood exam., Nov. 10, R.B.C. 4,200,000. Hemoglobin 71 per cent. Nov. 13, R.B.C. 3,056,000. Hemoglobin 56 per cent. Blood platelets 210,000 per cubic m.m. Nov. 14, the blood grouping test showed group (4). The blood of the donor, who was a nurse of our staff, was compatible, shown by test on Nov. 16, 1923.

Blood examination, Nov. 23, Hemoglobin 44 per cent.

ARGYROSIS: TWO CASES ACCOMPANYING CHRONIC SINUSITIS.

Dr. Marvin Jones, New York City.

Case 1: Mr. M., age 42 years, jeweler. Family history negative. Past history: Scarlet fever when young, has been married about twelve years. He had lues about eighteen years ago, after receiving treatment he has had five negative Wassermanns. History of present disease: About thirteen or fourteen years ago his associates noticed a disagreeable odor to his breath. He consulted a physician in regard to his condition and was told to use salt water as a nasal irrigation. The returns from these irrigations were filled with purulent discharge and large dried collections of material.

About one year later he was operated upon, the doctor telling him there was no drainage in his nose. This was the beginning of a series of operations for the relief of his difficulty.

The patient went to the Massachusetts General Hospital for an opinion as to his condition. This report was returned as having no sinus involvement.

He consulted another physician and was again operated upon. He next went to Fall River and this doctor removed something from his nose.

His next visit was to a doctor in Newark, who operated upon him and, as he describes it, partially cut and partially pulled something from his nose.

About eight or nine years ago he started using three drops of 5 per cent argyrol in his nose. This was gradually increased until he was using 20 per cent argyrol daily. He has used this daily with a three months intermission up to the time he came to me, Sept. 19, 1921.

The only evidence of general discoloration was that his friends told him he looked peculiar. This has not been in evidence during the past three years.

His complaint when he first consulted me was postnasal discharge, collection of scabs in nose and foul odor to his breath. This was diagnosed as ozena and treated as such.

He had an acute exacerbation of his chronic condition with an increased postnasal discharge and a bilateral supraorbital headache. There was no pain over the region of his maxillary bones and no tenderness. During this attack he was occasionally dizzy. The pains

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that he complained of radiated over the vertex and sometimes over the mastoid.

Both antra were irrigated and purulent matter returned. Double antromy was done at the New York Post-Graduate Hospital and treated by daily irrigations.

The discharge at this time reduced considerably and the patient felt relieved. Local applications of ichthyol and glycerin have been applied until Feb. 9, 1924, when he was sent to Central Park West Hospital for operation.

At this time the Canfield operation was done on his right antrum and considerable granulation tissue removed.

The condition at present shows discoloration of membranes of nose, having a distinct bluish gray tinge. This also extends into the pharynx and along the side walls of the throat by the posterior pillars.

An interesting feature of the case is that by transillumination there is almost complete opacity of all the sinuses although all the infection has been removed, at least from the antra. The return from irrigation being clear two weeks ago.

The X-ray plates of this case have unfortunately been lost or destroyed, but there was little or no obstruction to the rays.

HISTORY (AS WRITTEN BY THE PATIENT).

Case 2: M. C., female, age 27 years. No diseases in childhood except mumps and measles. Operation for appendicitis at age of 14 and had influenza during epidemic of 1918.

History of no importance until March, 1921, when an ulcer appeared on upper right jaw. Went to a dentist about four weeks to have tooth treated when he said it should be extracted. Had tooth extracted and the dentist found an abscess at end of the root. Two or three days after extraction inflammation began to spread with swelling and severe pain. The dentist then opened the right antrum through the cavity of the tooth, but said he could find nothing there. From that time on until August he continued applications locally, mainly silver nitrate. His diagnosis was a bad infection from the abscess on the tooth.

In August it began to get so bad he said he could do nothing more for me and he sent me to a dermatologist. He immediately diagnosed the trouble as Vincent's angina and began treatment for that, which consisted of the use of arsephenamine intravenously about every ten days and locally every day and numerous other applications. When it did not improve after about three months he started using silver nitrate and had me use it as a mouth wash. Not certain as to

length of time this was kept up, but in January, 1922, I began to fail very rapidly and went down to 80 pounds. He then gave me injections. What it was I did not know but was confined to bed after each injection. This all given without making a test of any kind, except a piece taken from my gums for pathological examination and the result of that was Vincent's angina.

In all that time my mouth was getting worse and it was allowed to fill up and then would have to be lanced to let the pus out. At that time was using Dakin's solution as a mouth wash. In May of that year while confined to bed following an injection my mouth was so bad that when the dermatologist said he did not make visits to patients' homes I asked the dentist to come to the house, which he did. He then started treating my mouth again and in the meantime I went to a medical man in an effort to get back my strength. About December, 1922, the dentist again started using silver nitrate and had me use it as a mouth wash, too. Kept that up about four weeks when he changed to menthylene blue with 50 per cent alcohol. Was using this when I came to New York in March, 1923.

On my first visit to an oral surgeon here he could not tell what it was until after the stain from the methylene blue passed away. He then said it was a very bad infection but had been over-treated and my mouth badly burned. He used very mild treatment until it began to improve a little so he could extract my teeth. After about six weeks he extracted three teeth and in about a month four more. He then found the gums to be in such a condition they would not heal and he operated and removed all the necrotic tissue and bone from the upper jaw. Inside of six weeks was able to have impression made for teeth.

In the meantime was also under the care of a medical man in an effort to get rid of the toxemia in my system. At that time my skin had a very decided bluish color and I only weighed 85 pounds. After several months under his care the color began to improve and I began to gain in weight, but the doctor could not understand the condition of the heart and said there was infection somewhere. The heart action was very irregular with many extra systoles. At times the irregularity caused great discomfort and uneasiness.

During all this time I had a very severe pain in my head and could get no relief whatever. The oral surgeon could not find the cause and he had me see a nose and throat man. He said I had impacted turbinates and an infected left tonsil. For about three weeks I could hardly stand the pain when the oral surgeon had me see another nose and throat man and insisted that he puncture the right antrum, which

he did, and with the first irrigation got a large return of pus and blood clots. Kept up the treatment for about three months when I could not stand the use of the trocar any longer and the doctor then told me he could find nothing, even after puncturing both antra. I felt almost certain the instrument never went in the left antrum for I could never feel it and had no sensation of water going in. He said it did go in but I could not feel it on account of the cocain and that the return of clear water proved nothing was there.

Case 2: Nov. 15, 1923, patient consulted me and her finding were as follows: Severe headache, especially marked over left side, profuse discharge from both nares, inability to sleep, extremely nervous and hyper-sensitive.

Nasal examination revealed hypertrophied and congested right and left middle turbinates. The left being impacted and the septum deviated high up to the left. This was so marked as to render any operative procedure on the left side difficult. There was a ridge running the floor, which made an irrigation of the antrum extremely difficult.

Transillumination of sinuses showed almost complete opacity over all the sinuses.

I advised her to have a sub-mucous resection with a left middle turbinectomy and bilateral anthrotomy. This she consented to have done and was operated upon at the Post-Graduate Hospital, Nov. 17, 1923.

Her convalescence was rather stormy. She had persistent severe and continuous headache over her left frontal region. The temperature never went over 102° but continued from 101°-101.5° rectal temperature, up to the time of her discharge from the hospital about two weeks later.

Her pain gradually diminished and she proceeded to gain in weight. About three weeks to one month later she had a recurrence of the pain over forehead with an increase of discharge in the posterior part of the middle meatus.

Her ethmoids and sphenoid on that side were then opened with relief of the pain.

The antrum irrigations continued profuse, the character alternating between floculent masses and cloudiness, from time to time.

She was advised at time of first operation, that a radical operation on both antra would probably be necessary at a later date, her general condition being such as to render this operation rather hazardous at that time.

The return in the last three weeks has markedly diminished and at present time, she is being irrigated twice a week.

I have advised a double radical antrum operation, which she will probably have at a later date.

Her general coloring is gradually improving and was most noticeable about two or three weeks after the operation.

I have no explanation for this improvement except that possibly as in Case 1 a discontinuance of the silver salt has caused it.

Again in this case the X-rays will show that the silver caused little shadow under the X-ray, but transillumination showed opacity.

It would therefore be very easy to be mistaken in diagnosis if transillumination were not supplemented by radiograph.

FOREIGN BODY IN THE NECK.*

Dr. J. E. Sheehan, New York.

This patient was struck by a motor-car during the summer of 1923 and received a severe wound under the right lower jaw, with a fracture of the lower mandible. The neck became markedly swollen and the wound severely infected. Three weeks after the injury she was removed to the Middletown Hospital and remained there three weeks.

When she left the hospital the wound had almost healed and her temperature was normal, but the neck still remained swollen. Between this period and the time she entered the Post-Graduate Hospital, Dec. 27, 1923, there was a persistent neck swelling, which, acting on advice, she had endeavored to reduce by massage and head movements. The results being negative, she was referred to me Dec. 27, 1923, for a dislocation of the trachea and for the repair of an ugly scar which had resulted from the injury.

Examination showed that there did not exist a dislocation of the trachea, but the Roentgen examination disclosed the presence of a foreign body, and the swelling was thus accounted for.

On Jan. 4, 1924, Dr. John F. Erdman observing, the foreign body, which had been thoroughly imbedded in the carotid sheath, was removed. There existed a collapse of the jugular vein and a very marked erosion of the carotid artery, undoubtedly due to the massaging and head movements by which the foreign body was continuously forced inwards against the great vessels of the neck. On examination, it proved to be a part of the door handle of the motor. It weighed about 3 ounces, was 1¾ inches long and ½ inch wide. The patient left the hospital five days after the operation.

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

LIGATION OF THE SPHENO-PALATINE ARTERY FOR SEVERE HEMORRHAGE FOLLOWING THE ETHMO-SPHENOID OPERATION.*

Dr. Simon L. Ruskin, New York.

I must beg the indulgence of the members of the Section in presenting these anatomical specimens. The work that I am presenting is part of the anatomical research program carried on by Dr. Imperatori's staff at the New York Post-Graduate Hospital. We were confronted by the problem of stopping severe, almost fatal hemorrhage following ethmoidectomy.

Severe bleeding can come from injury to the anterior and posterior ethmoidal arteries, both branches of the ophthalmic artery, or from branches of the sphenopalatine artery. It is with the latter vessel that we are concerned tonight. Almost at the end of the ethmoid-sphenoid operation one occasionally meets with sudden and severe bleeding that in a moment fills the nose and makes further work impossible. One realizes at once that a good sized vessel has been injured and packing may or may not control it. This severe bleeding may come from two sources, the nasopalatine artery or the posterior lateral nasal artery, both branches of the sphenopalatine artery. The nasopalatine leaves the sphenopalatine artery through the sphenopalatine foramen to run along the lower portion of the anterior wall of the sphenoid to the septum, where it takes about the same course as the nasopalatine nerve. It is in the removal of the anterior wall of the sphenoid that this vessel is injured. The other vessel that gives severe bleeding is the posterior lateral nasal artery that also leaves the sphenopalatine foramen to break up into branches supplying the turbinates and posterior ethmoidal cells. This vessel is injured when working near the posterior tip of the middle turbinate. It is also a frequent source of bleeding following the removal of the posterior tip of the middle turbinate.

The sections shown tonight were made with the intention of determining a feasible method of approach for tying off the sphenopalatine artery for bleeding from its inaccessible branches.

The sphenopalatine artery lies immediately behind the posterior wall of the maxillary sinus and can readily be reached by the removal of the upper medial quarter of the posterior sinus wall. The bone here is quite thin and easily broken through. The sphenopalatine

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ganglion and its branches lie behind it separated by a pad of fat and connective tissue. A small amount of dissection reveals the artery which can then be clamped and ligated. One must of course be thoroughly familiar with the regional anatomy before attempting the ligation. There are of course many methods of stopping nasal bleeding and ligation of the sphenopalatine artery can only be considered as a desperate measure for severe cases.

351 West 86th St., New York City.

REPORT OF CASE OF SECONDARY HEMORRHAGE IN INTRANASAL SURGERY.*

Dr. Saul J. Selkin, New York.

A. S., male, age 26 years. Dec. 4, 1923, case to the Post-Graduate Clinic. Complaint: Inability to breathe through the nose, especially at night, also frequent sore throat.

Examination: Male of normal build, well nourished. Rhinoscopic examination, hypertrophic inferior turbinals, the septum was deviated to the right, spurs at the region of the Vomer. The mucous membranes appeared red and injected. The middle turbinal on the right side, normal, the left slightly polypoid; likewise the tip of the inferior turbinal on the left side.

The throat examination: Hypertrophic cryptiform tonsils enlarged and infected. The anterior and posterior pillars greatly injected and red. The hypo- oro- and nasopharynx negative. Tonsillectomy and submucous resection advised.

Dec. 6: A local tonsillectomy was done by Dr. Selkin with practically no loss of blood, the recovery was uneventful.

Jan. 7, 1924: The tip (posterior) of the inferior turbinate on the left side was removed, also without any bleeding. Patient reporting on the next clinic day for observation. No bleeding.

Jan. 31: Submucous resection was done wtihout any bleeding during the operation nor on removing the packing.

Feb. 20: The polypoid middle turbinate was removed with little curettement at the ethmoidal region. Patient in sitting posture, local cocain anesthesia, no packing. In this operation as in the above, hardly any bleeding was experienced during or after operation; it was never deemed expedient to keep him at the hospital over night.

Feb. 24: A topical application was instituted in the clinic, the operative field was dry and clean.

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Feb. 26: Five days after the operation on the middle turbinal with slight curettement at the ethmoidal area a few drops of blood appeared, but on Feb. 27, p. m., while riding on a truck, profuse bleeding occurred. The nose was then packed by the family physician, controlling the hemorrhage temporarily; during the night he was packed and repacked while the bleeding continued. He was brought to my office Friday Feb. 28, 9 a. m. I then removed the packing, and the bleeding during the manipulation was very profuse. I repacked him tightly with vaselin gauze, packing both nares but no posterior plug. An injection of fibrinogen (Mulford's) was given. At 4 p. m. some bleeding returned, and fearing a hemorrhage he came into the hospital. He was then admitted to ward of the Post-Graduate Hospital, his pulse on admission was 120, he was weak and pale. With the packing in situ he bled intermittently during the night and the next day.

Feb. 29: 20 c.c. of horse-serum was given and fibrinogen 2 c.c. every four hours.

The packing was changed at intervals for tighter packing with no avail, while the bleeding point could at no time be found, due to profuse bleeding.

Mar. 1: Coagulation time, 3½ min. Erytrocytes 4,914,000 per c.c. Hemoglobin 71 per cent, 11.5 gr. per c.c. Bleeding continued as above with progressive exsanguination, so that on Mar. 3, Dr. Selkin repacked the nares with 5 per cent iodform packing and inserted double posterior nasal plug; this was followed by a blood transfusion by Dr. Unger of 500 c.c. After this no bleeding from the nares or the pharynx occurred. The posterior packing was removed in 48 hours, but the nasal packing was not disturbed for another 24 hours and then only gently loosened up and a small portion cut off as oozing would start. This procedure was followed daily until the entire packing was removed. The packing that rested on the nasal floor and against the inferior turbinated coming away last. It was distinctly noticed that the packing from the middle meatus and above at the area of the operation was practically dry, and at all times the bleeding appeared to be coming from the region of the inferior turbinal or the middle meatus. During the hemorrhage period the exact location of the bleeding point could not be ascertained.

Mar. 7, hemoglobin 45 per cent, 7.3 c.c.; Mar. 12, hemoglobin 45 per cent; 7.3 c.c.; Mar. 13, hemoglobin 46.6 per cent, 7.7 per c.c.: Mar. 14, hemoglobin 54.1 per cent, 8.9 c.c.; Mar. 15, hemoglobin 56 per cent, 9.5 c.c.

114 East 61st St.

CASE OF CERVICAL GLANDS SECONDARY TO CARCINOMA OF ESOPHAGUS.*

Dr. Julius Klepper, New York City.

This case is presented to show the early involvement of the cervical glands in carcinoma of the esophagus. The photograph shows the extent before the esophageal symptoms were developed sufficiently to make the patient really alarmed by his condition.

E. J. I., a laborer, age 55 years, was actually forced by his sister to come to my office on Dec. 27, 1923, with the following history:

In March, 1923, he slipped on the ice, at Pompton Lakes, N. J., and came to a hospital in New York (the name of which I withhold). While there he complained of a choking sensation in the throat, which he attributed to a bone. He also felt what he called "a little pimple" on the side of his neck. He was examined and was told that nothing of importance could be found. Some teeth were extracted; and he was told that it would be to his advantage to have a large cyst on his forehead removed. This cyst really worried the hospital more than the pain in his neck.

The patient is of a diffident type, and would rather not be bothered with himself. He would not be alarmed by anything concerning his body.

On leaving the hospital he forgot about the bone in his throat, and the pimple on his neck; and, as I said, was actually forced to seek medical attention, eight months subsequently. While in my office, he said he felt quite well, except that he could not swallow very solid food with the same ease as previously; and felt a slight pressure on the neck. He attributed all the trouble to his fall, when he struck his shoulder. He lost 30 pounds of weight in the last four months.

He gave no history of hoarseness, nor bleeding, and no pain in protruding the tongue. He had spells of coughing, slight discomfort in the stomach and regurgitation at times only. He had some pain in the right shoulder.

On examination he showed the following symptoms: slight ptosis of upper lid; some emaciation; a large hard mass the size of a fist protruding on the side of his neck, attached more toward the vertebral column, partly under the clavicle, and slightly softer than you

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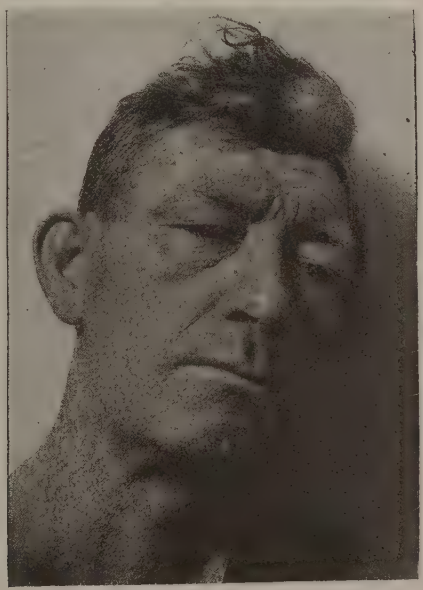
would expect. Heart negative; lungs negative; vocal cords perfectly normal. He swallowed water (as a test) with perfect ease.

The case was admitted to the hospital the following day, in the service of Dr. Forbes.

Examination of the blood showed a negative Wassermann. X-ray report reads as follows:

On examination by bismuth the esophagus shows a moderate dilatation down to about the level of the third dorsal vertebra. Below this for a distance of about 2 inches the esophagus shows irregular canalization with an increased density here suggesting mass formation—the probable infiltration of malignancy.



Mr. E. J. I., Jan. 9, 1924.

A further examination shows a mass density especially noticeable in the right cervical region—this extending downward and apparently involving the superior mediastinum.

On Jan. 9, 1924, he was esophagoscoped. The lumen showed up perfectly well for about 22 c.m. from the teeth, when it suddenly narrowed and showed a thickening and bulging in the right wall where we decided to take a specimen. The mucous membrane down to this region showed no discoloration or change from normal, no fungoid growth, and no bleeding. We were able to esophagoscope part of the infiltrated area.

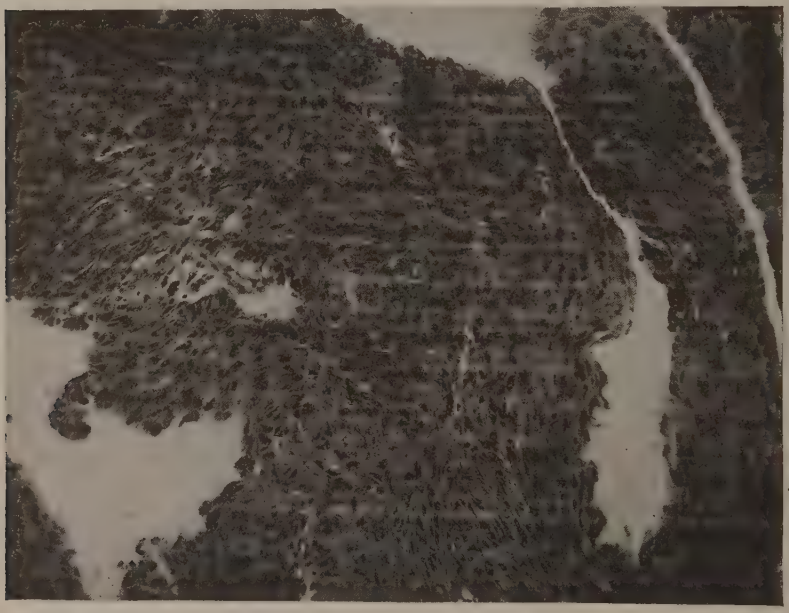
The report of the laboratory was as follows: The specimen shows on one side a lining of squamous epithelium. The stroma is heavily

infiltrated by leucocytes and lymphocytes and contains large islands of squamous cells which show irregularites in size and shape and occasional mitotic figures.

Diagnosis: Squamous cell carcinoma.

The patient was advised a gastrostomy because we thought it better to have this done before commencing the radium treatment. He refused the operation; and declined the radium treatment on account of the expense attached.

He left the hospital and has not since returned. Two weeks after the esophagoscopy his sister telphoned and told me of a marked improvement. The patient could eat eggs, bread, chopped meat, potatoes, and could also take a glass of good whiskey. This improvement was probably due to the esophagoscopy.



Carcinoma—Squamous. E. J. I., Specimen from esophagus.

Since then, I have only heard from this patient once. He had not yet undergone the gastrostomy and still did not have the radium treatment. He is at present, after several changes, at the Welfare Hospital, but the glandular condition is progressing according to his sister's report.

SUMMARY.

1. The glands involved were: the supraclavicular and the superior posterior mediastinal glands. The glands of the neck were unduly large for the esophageal symptoms.

2. The involvement of the esophagus was nearly three inches below the cricoid at the aortic constriction of the esophagus and above the bifurcation of the trachea. At the time of the esophagoscopy there was no dissolution of the tissue in the lumen of the esophagus.

3. This case adds one more item to the long disputed series of statistics as to the frequency of malignancy in favor of the upper third of the esophagus near the bifurcation of the trachea and not at the cricoid.

4. Early application of radium *might* have acted favorably.

5. This case also shows that there will nor necessarily be an early breaking down or dissolution of the lumen, or necessarily severe pain, cough, or hemorrhages or rapid diminution of ease in swallowing before the glands become involved to the extent we see in this patient.

6. Lastly it proves that esophageal symptoms, especially in a man past 50, should always be carefully investigated.

338 W. 29th St.

CYST OF THE INFERIOR TURBINATE.*

Dr. Morris Rosenthal, New York.

S. E., age 32 years, housewife, no children. Came to the Post-Graduate Clinic on Dec. 1, 1923. Complaint: Small swelling at juncture of nose and cheek on the right side for the last six months. No pain, no tenderness, no nasal obstruction.

Examination: Pink mass about the size of half an almond, extending from the external nares on the right side along the inner lateral wall of the nose to and including the anterior end of the inferior turbinated. Mass does not shrink on application of cocain. There is no pain on pressure. The mass apparently contains fluid.

Treatment: Cyst aspirated; cloudy liquid withdrawn.

Bacteriological report: Agar culture: no pus, no organisms. Few staphylococci, probably due to contamination. Smear: no pus, no organisms.

Subsequent history: Feb. 18, 1924, patient seen again. No recurrence of fluid. The mucous membrane is contracted and smooth.

324 E. 18 Street.

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

BONE AND CARTILAGE OF THE TONSIL: PERSISTENT BLEEDING FOLLOWING REMOVAL OF ONE TONSIL.*

Dr. Milton Reder, New York City.

Patient, M. K., male, tailor, age 24 years; nationality, Poland (one year in United States).

Chief Complaints: 1, cough; 2, dry sensation in throat; 3, sore throat.

Previous history: Medical: Typhus four years ago. Surgical: Submucous resection three years ago. Previous to which patient has been a persistent mouth breather.

Family history: Irrelevant.

Present illness: Cough for past eight months, dry, hacking and non-productive. Dry sensation in throat since submucous resection three years ago. Sore throat, three to five attacks a year.

Physical examination: Heart and lungs, negative.

Laryngological examination: Examination showed both tonsils to be small, ragged, crypts filled with purulent detritus, which could be expressed by slight pressure. Palpation suggests a gritty sensation to the examining finger. Bleeding time, 6 minutes. Coagulation time, 4 minutes. Platlet count, 136,260 per c.m.

X-ray examination: Shows a slight increase in density of the soft structures under the angle of the jaw, may suggest fibrosis. X-ray of thorax: Slight hilus and root thickening.

Feb. 24, 1924: Patient prepared for a local tonsillectomy. Right tonsil removed, followed by profuse hemorrhage. It was impossible to clamp and tie every bleeding point; as a matter of fact, the more we clamped the greater was the hemorrhage. Adrenalin, fibrinogen, tannic and gallic were of no avail. Finally pressure with a probang saturated with adrenalin, tannic and gallic, held in the tonsil fossa for two hours checked most of the hemorrhage, although slight oozing existed for twenty-four hours.

Pathological examination: Gross: Tonsil measures 20x17x14 m.m., mucous surface is prominent, the crypts are deep and the capsule is very hard. Spicules of bone can be felt.

Microscopic: Sections from the tonsil show the lining epithelium sharply defined. The crypts are rather deep and filled with necrotic

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

material. The germinal centres of the lymphatic tissues are larger. The septa extending between the lymphatic tissue are markedly thickened and composed of homogeneous connective tissue. The connective tissue near the base is markedly thickened and shows diffuse infiltration with lymphocytes. The capsule contains numerous foci of cartilage which shows calcification and trabeculae of bone, true bone and bone marrow spaces filled with fatty marrow. The blood vessels in the capsule show a marked thickening of the wall.

Diagnosis: Chronic tonsillitis with calcification and ossification of cartilage in the capsule.

Discussion: Of 2000 pathological examinations done at the Post-Graduate Hospital, only one other showed the presence of bone and cartilage in the tonsil, whereas from 15 to 20 per cent showed the

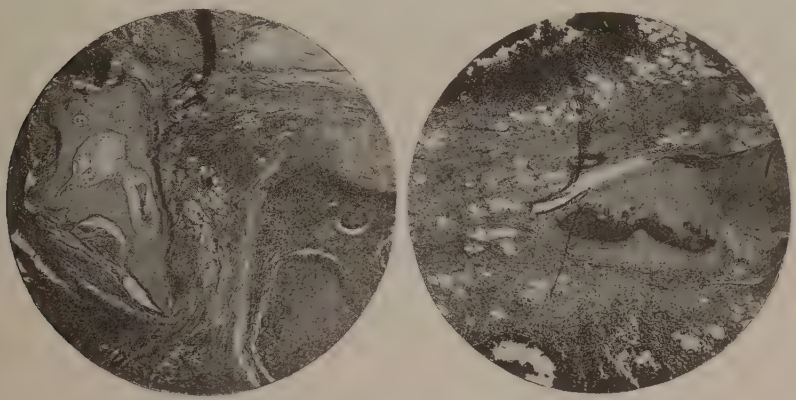


Fig. 1. Formation of bone with bone marrow.
Fig. 2. Shows metaplasia of bone and cartilage.

presence of cartilage with or without the presence of chronic inflammation, which indicates that cartilage formation in tonsillar tissue is common and not dependent on chronic inflammation for its etiology.

The pathological picture in this case seems to support the theory that bone in tonsillar tissue is a result of a metaplastic metamorphosis, as is shown in Fig. 2. It is not the result of an abnormally long styloid process as the islands of bone are studded throughout the tonsil. However, bone may be the result of a vestigal remnant of the second branchial arch or the development of misplaced embryonic rests.

DOUBLE ETHMOIDITIS IN AN INFANT.

Dr. J. J. Salerno, New York.

An infant 3 months old was referred to me on Dec. 2, 1923, by Dr. Morris, for a swelling of the left eye.

History: Family history negative. Past, child eight months at birth, being premature, weight 5½ pounds; no disease. Present, cold in head for about six days, irritable and somewhat feverish. For past three days left eye swollen and red.

Examination: Lungs congested, heart O. K. Left eye swollen, red and tender. Nose, increasing discharge. Temperature 100.5°, pulse 110.

Treatment, aspirated swelling and found pus. Then made incision and evacuated considerable amount of pus. Advised hot boric acid compresses, 10 per cent argyrol, to nose and eyes.

Next day, swelling over left eye somewhat lessened but still discharging pus from incision. Noticed beginning swelling over other eye, for which I ordered boric acid compresses. Following day, condition worse and case admitted to the Post-Graduate Hospital, service of Dr. T. J. Harris, on whose staff I am. On admission, both eyes edematous, with discharge of pus from incision before made. Temperature 102°, pulse 120.

Diagnosis: Acute purulent sinuses and beginning broncho-pneumonia.

Eyes examined by Dr. Cohen and found normal.

Laboratory findings: Wassermann negative. Eye smear, moderate pus cells. No grams. Negative cocci. Blood: Leucocytes, 22,000; poly., 74 per cent; lympho., (small) 19 per cent, (large) 7 per cent. Urine: Occasional white blood cells. Epithelial cells. Otherwise normal.

Dec. 5: Big toe of right foot swollen, red and tender. Incised toe and also swelling of right eye, yellowish pus. Blood Agar: Staphylococcus aures.

Dec. 9: Swelling both wrists, incised. Yellowish pus. Blood agar: Staphlylococcus, hemolypticus. Made vaccine 1 c.c.-1000 millions and injected. Conditions became worse and child died Dec. 14.

Treatment: Incisions. Hot boric acid compresses to eyes. Solution argyrol 10 per cent to eyes and nose. Mg. S04 wet dressings to big toe and wrists. Vaccines.

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*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

CARCINOMA OF THE TRACHEA.*

Dr. Thomas J. Harris and Dr. H. H. Forbes, New York.

The patient was a man, age 40 years, who presented himself at the Clinic Nov. 1, complaining of hoarseness, which had existed for a very short period of time. Examination of the larynx showed complete paralysis of the right cord; X-ray examination showed the chest was negative; examination of the blood for syphilis was also negative. Eight days later the patient presented himself again, complaining of dyspnea, and was admitted to the hospital with the idea of doing a tracheotomy, but under local treatment the dyspnea subsided and the tracheotomy was not necessary. An interesting point was that a diagnosis of asthma was made and it was expected that it would disappear, as it usually does, but it was not relieved at all and the man had great difficulty in breathing and swallowing, though he made no complaint of difficulty in swallowing when first seen on Nov. 1. He was finally transferred to the Medical Department, and Dr. Harris was advised that the man should be immediately tracheotomized. He did not, however, think this was called for. When seen that afternoon examination showed no change in his laryngeal condition, and after talking with Dr. MacPherson and Dr. Forbes it was decide to have a complete endoscopic examination, which Dr. Forbes immediately carried out. At about the third ring of the tracheal cartilage there was a pedunculated mass which rose and fell with respiration, and which seemed more like a papilloma than anything else. This was completely removed and the specimen was sent to the laboratory. Later, an esophageal examination was made, and involvement of the esophagus was found, probably a metastasis (with pressure on the esophagus).

The relief was immediate, and the patient rapidly convalesced. The later history of the case was *1*, the pathologist reported the specimen to be carcinomatous material; *2*, the patient developed other metastases throughout the body, and finally died.

(Case reported in full at the meeting of the American Laryngological Association, June 2-4, 1924.)

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

HEMIANGIOMA OF THE NOSE.*

Dr. Morris Rosenthal, New York.

I. M., housewife, age 44 years, no children. Came to the Post-Graduate Clinic Oct. 13, 1923. Complaint: Nose bleeds for the last two months. Examination: Mass on the right side of the septum, anterior inferior corner. Quadrangular shape about three-quarters of an inch each way. Whitish, thick, soft, bleeds easily to the touch. No pain on pressure.

Operation Oct. 16, 1923; mass resected with a snare, under 10 per cent cocain applied locally on swab. No unusual bleeding following operation. The surface under-growth shows smooth cartilage.

Subsequent history: Oct. 18, 1923, site of operation shows small exudative membrane. Since time of operation there has been no pain or bleeding. Surface of septum is smooth and there is no evidence of recurrence.

Laboratory report of specimen: "Specimen is partly lined by stratified squamous epithelial cells which ceases abruptly and the surface is covered with an exudate composed of leucocytes and fribin fibres. In the deeper areas the stroma is composed of very numerous blood vessels which have the appearance of newly-formed blood vessels. The stroma between the blood vessels is edematous and heavily infiltrated with leucocytes. In the deeper parts there is one area which is also very rich in blood vessels but presents a somewhat different picture as the arrangement of blood vessels is denser and no infiltration with leucocytes can be found. In this area one endothelial cell with a mitotic figure could be found. This picture could suggest a hemangioma which became ulcerated and due to this destruction the picture is obscured. Infiltration of the stroma by tumor cells is not present.

Diagnosis: Subacute purulent inflammation with ulceration on the surface, perhaps on the base of an ulcerated hemangioma.

Note: The definite differentiation between the hemangioma or a suppurated vascular granulation tissue could not be made. The diagnosis of a hemangioma would explain the unusual seat of the tumor in the nose. Hemangiomas are benign tumors which recur only if not fully excised."

324 E. 18 Street.

*Read before the Section on Laryngology and Rhinology, New York Academy of Medicine, Mar. 26, 1924.

PHENOL BURNS OF THE LEFT EYELIDS, EYEBALL, UPPER FACE AND TEMPORAL AREA.*

Dr. J. E. Sheehan, New York.

A.D., male, age 27 years, received a very severe carbolic acid burn, Oct. 2, 1922, which involved the upper and lower eyelids, eyeball, upper face and temporal areas. When admitted to the Post-Graduate Hospital, the areas around both lids were totally destroyed, including the eyeball, and the upper face region and temporal areas were in a frightfully sloughing state and extremely sensitive.

Apr. 13, 1923, the first operation was performed for the repair of the upper eyelid by an epithelial onlay. Previous to this operation Dr. Martin Cohen, of New York, removed the lacrymal gland.

May 5, 1923, the second operation was performed for the repair of the lower lid and upper face area, by utilizing a supraorbital artery flap of a forehead skin, the uppermost part of the flap carrying with it a margin of hair to replace the loss of the lower lid lashes. loss by using a scalp flap carrying non-hairy skin from the post-auricular region to cover the cheek defect while extending the beard area.

May 29, a third operation was performed to repair the temporal loss by using a scalp flap carrying skin of the post-auricular region.

Oct. 18, 1923, return of the forehead flap.

Oct. 26, 1923, enucleation of the eyeball by Dr. Martin Cohen. This was replaced later by an artificial eye.

Nov. 9, 1923, the fifth and final operation was performed, which consisted in the return of the scalp flap.

Since then he has returned to the occupation in which he was engaged before the disaster. Functioning is natural and the cosmetic result all that could be desired.

*Abstract of cases presented before Throat Section, New York Academy of Medicine, Mar. 26, 1924.

REPORT OF A CASE OF CEREBELLAR ABSCESS OF OTITIC ORIGIN.

Dr. C. F. Yerger, Chicago.

According to the statistics of Cook County Hospital for the decade ending in 1920, brain abscess secondary to suppurative otitic disease occurs in the ratio of two per 1,000; 35 per cent of the brain abscesses due to all causes were of otitic origin, of which cerebellar abscess occurred in 12 per cent. Brain abscess was found to be third in frequency among the intracranial complications of otitic origin, being exceeded by meningitis and sinus thrombosis. Parenthetically, it is of interest to note, that suppurative middle ear disease was recorded in the history or physical examination in but 25 per cent of the autopsied cases of otitic brain abscess; also, that this omission occurred not infrequently in the cases of otitic meningitis. I, therefore, wish to urge the necessity of making a more thorough otological examination in all cases of threatened or manifest intracranial disease which may be the result of otitic suppuration. According to Jansen, brain abscess is about six times as frequent in chronic as compared with acute suppurative otitis media.

Cerebellar abscess is not infrequently confused clinically with labyrinthitis, as both have many symptoms and signs in common, as, vertigo, falling, nystagmus and past-pointing; hence, the differential diagnosis may be very difficult as demonstrated in the following case.

Report of case: H. A., male, age 18 years, states that his left ear began to ache Jan. 31, and that two days later, the ear began to discharge and mastoid tenderness appeared. Four days later, Feb. 4, he entered the Illinois Eye and Ear Infirmary when examination of the left ear showed a central perforation with profuse purulent discharge, marked mastoid tenderness, leucocytosis of 23,600 and fever of 99°. After five days of treatment, he felt so much better he asked to go home; as the examination was negative except for the otorrhea, his request was granted with the understanding that he must come back daily for treatment.

This he did not do. He did not return until four days later when a Bezold's mastoiditis was diagnosed. He had a fever of 100°

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and a W. B. C. of 31,000. Under local anesthesia, a simple mastoidectomy was done immediately, i. e., on Feb. 13, or thirteen days after the onset. The tip cells were necrotic; the superior half of the mastoid was sclerotic. During the operation, the dura of the posterior fossa was accidently exposed.

The post-operative course was uneventful until the third day when the temperature arose to 103°, without chill but with headache. A profuse purulent discharge from the mastoid wound was present. On the seventh post-operative day, he complained of vertigo and tinnitus. Examination showed a first degree nystagmus towards the left; whisper, left ear, at three feet; no spontaneous past-pointing present; caloric test (hot) of right ear, resulted in a marked horizontal nystagmus toward the right, in the supine position; fever absent; sensorium clear. Dr. Alfred Lewy, who saw the case with me, agreed that these phenomena were due to labyrinthine irritation. On the tenth day, a spontaneous nystagmus, first degree, towards each side was noticed, but spontaneous past-pointing and fever were absent; a positive Kernig and rigidity of the neck were present. Fundus negative. The ear was dry and the mastoid wound had ceased to discharge. On the twelfth day, the spontaneous nystagmus did not change, fever absent, and he vomited several times. On the fourteenth day, the temperature, pulse and respiration continued normal, spontaneous nystagmus continued, spontaneous past-pointing was present on the left, i.e., with his left arm, he usually past-pointed outward, but occasionally he pointed inward or touched. Adiadokinesis was present on the left side. Caloric test, left (hot water, temperature 112°), did not produce any nystagmus at the end of five minutes. The hearing in the left ear was absent. The Weber test was lateralized to the good ear. Fundus negative. Lumbar puncture showed a clear spinal fluid, 120 cells, and absence of bacteria on smear and culture. Diagnosis; sympathetic meningitis and cerebellar abscess. Dr. Lewy, who again saw the case with me, concurred in the diagnosis. As the report of the examination of the spinal fluid could not be obtained until the next day and as a neurological examination had not yet been made, the operation was delayed until the following day.

Dr. Clarence Neymann, on neurological examination, found the knee jerks absent on the left side, abdominal reflex markedly exaggerated on the left side. Face and tongue and soft palate show slight weakness on the left side. Babinski and Gordon are suggestive on the right side. Kernig is present on both sides and Brudzinski leg and neck signs are present. There is a definite

ataxia and inco-ordination of the left side as demonstrated by the finger to nose and heel to knee tests. Asynergy is marked as shown by a positive left adiadokokinesia test. The left arm points spontaneously towards the left; vertigo is marked; the patient falls toward the left and backward.

Dr. Neymann made the diagnosis of labyrinthitis with a dead labyrinth and advised surgical intervention as far as the labyrinth was concerned, but expressed his opinion as being unalterably opposed to incising the dura to explore for a cerebellar abscess. Accordingly, a Jansen's labyrinth operation was performed. During the operation, the dura of the middle and posterior fossa was freely exposed and found normal.

Post-operative course: Following the operation for two days, the patient seemed to be improved, but on the third day he took a sudden turn for the worse and died that night.

Permission for an autopsy could not be obtained. On opening up the operative wound and incising through the exposed dura of the posterior fossa the cerebellum was normal in appearance, but an incision into the lateral lobe of the cerebellum evacuated about 15 c.c. of a thick creamy yellow pus. This confirmed the previous diagnosis of abscess of the cerebellum.

With a fairly complete otological and neurological examination before us, let us analyze the symptoms and signs, with a view to determine whether the lesion was one of suppurative labyrinthitis or cerebellar abscess, or both.

Briefly considered, in favor of labyrinthitis are *1* tinnitus, *2* a spontaneous nystagmus of labyrinthine origin is composed of two components, slow and quick and is of short duration, usually lasting but two or three days, *3* labyrinthine deafness; the left cochlear nerve was dead. *4* Left labyrinthine nerve was dead, as shown by no response to the caloric test. *5* Vertigo and falling. The patient fell towards the side of the diseased ear. A change in the position of the head will cause a change in the direction of the falling in a labyrinth lesion. This test was negative. *6* Vomiting is always preceded by nausea and is not projectile. The patient vomited several times; it was unassociated with nausea and was not projectile.

The symptoms and signs in favor of a cerebellar abscess were *1* those of a sympathetic meningitis, as headache, stiff neck, Kernig and Brudzinski signs; the spinal fluid was sterile and contained 120 cells. A persistent and severe headache is frequently associated with meningitis and brain abscess. *2* Ataxia and inco-ordination of the

left extremities. *3* Asynergy as demonstrated by adiadokokinesis of upper left extremity. *4* Vertigo; patient falls towards side of lesion and the direction of the falling is not influenced by change in position of the head. Test positive. *5* Spontaneous outward past-pointing of the left upper extremity. *6* Spontaneous nystagmus is ataxic and is towards the side of the lesion; it persists longer than two or three days. *7* Optic neuritis or choked disc is frequently associated with a cerebellar abscess. *8* Vomiting is projectile and unassociated with nausea.

COMMENT.

Thirteen days after the onset of an acute middle ear inflammation, a Bezold's mastoiditis was present; fourteen days after a simple mastoid operation, a cerebellar abscess was diagnosed, which was twenty-seven days from the onset. The abscess was no doubt present on the twenty-third day or the tenth post-operative day as suggestive signs of a sympathetic meningitis were already present. The interval between the onset of the suppurative ear disease and the diagnosis of the brain abscess was extremely short when compared with the one reported by Bezold, in which the interval was forty-six days.

In retrospect, we can now say with certainty, that it was a mistake to delay the exploratory operation from the tenth to the fourteenth post-operative day and that it was a still greater mistake not to incise the dura and explore the cerebellum for evidence of a cerebellar abscess which was present and which was diagnosed by the two otologists but was not confirmed by the neurologist. This case also emphasizes the fact, that the exercise of surgical judgment and procedure should be left entirely to the discretion of the operating surgeon.

4100 West Madison Street.

SYPHILIS FROM THE RHINOLOGICAL STANDPOINT.

Dr. James A. Babbitt, Philadelphia.

Specific involvement of the nasophaynx is a matter of peculiar concern to the otolaryngologist, and no place in his field of contact, from ears to larynx, requires greater caution in analysis, finer distinction in diagnosis or keener judgment in treatment.

In diagnosing syphilis of the nasal cavity, one misses the precision of the functional ear tests, the clearness of outline in oropharynx and larynx, and instead, must deal with a confusion of symptoms and protean changes in the mucous surface. It is not appropriate here to discuss syphilitic stages or minute pathology, but attack directly the defense we wish to break—the obscurity in this area. We want to know how to recognize and handle nasal syphilis.

In review of the literature one is impressed with the negative side of this diagnosis—the condition labelled "snuffles" and "the failure under long continued and well advised treatment to relieve an apparent cold", could scarcely be termed scientific basis for suspicion, yet the experience of all will testify how frequent an incentive for search this has been. The writer once questioned in a former discussion, a noted laryngologist, as to how frequently he had encountered syphilis in his practice, and he replied with an expletive "I always believe they have it until they prove they haven't." This might be a prudent course, but would unnecessarily condemn the optimism of routine treatment in conditions, acute or sub-acute, of functional derangement.

The primary lesion in the nose is not a very common affair, and is not usually simple to recognize when there. Phillips in reviewing statistics, quotes Buckley as recording 95 primary lesions in the nose out of 9058 cases of syphilis, and Basserau, Clerq el Forte Toumier and Record, found only two primary lesions in 2244 cases. Various authors have reported cases, however, and described their findings.

The Hunterian sore when diagnosed, may be found just within the alae, at the line of mucous membrane; on the line of vomer junction with the cartilaginous septum, at the edge of the vertical plate, or even more obscured. Its etiology, may in a measure change its aspect. To a considerable degree these cases come under Buckley's classification, "Syphilis of the Innocents". Picking the nose, improperly or non-sterilized treatment instruments—applicators, specula or Eustachian catheters—and less frequently, perverted sexuality, are the more frequent causes, and surface erosion from mild but constant traumatism and the continuous irritation from nasal secretions always modify the picture.

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*Read before the Philadelphia Laryngological Society, May 6, 1924.

On account of the exposed area, modification of surface scabs, changes in texture and color, which might readily be diagnosed furuncular, eczematous or simply infective it is not surprising to find the more prolific report and demonstrations of nasal syphilis in the secondary or tertiary stages. The malady does not usually appear definitely specific until the appropriate time to search for aid in more remote general manifestations. Scarlet, in his review, classified the changes in appearance of the nasal lesion as *1*, erosive; *2*, neoplastic; *3*, scabbed or impetiginous. He describes the erosive form as so mild that the patient seldom complains, color carmine-red, flattened surface, up to a centimetre or more in diameter, rounded or oval, and as having some burning sensation when cleansed. Neoplastic form; general papular appearance, convex and surface eroded, uniformly red or dotted with gray points, center elevated 2 or 3 m.m. and elastic, rather firm to touch, 1 or 2 c.m. in diameter. The scabbed form is peculiarly difficult to diagnose. Surface is irregular and formed of scabby strata, never very thick, variable in color, yellowish or impetiginous tint.

Ballinger has carefully compared the tubercular and syphilitic ulcer, emphasizing in the former the superficial character, moth-eaten edges, mild areola, grayish, ropy secretion and indistinct demarcation, as against the depth, angry areola, sharply defined margins, yellowish purulent secretion and distinct demarcation of the latter. Two suggestions are pertinent in the matter, one from Ramognini, that the intranasal course is much longer than in more frank situations, the other from Bilancioni, that the intranasal symptoms are increasingly obscured as immunity increases; both of these suggestions are clearly correlated.

Fundamental to all of this is the general subjective symptomatology. The syphilitic nose is badly blocked and yet with rather a scanty thick secretion for so much stenosis, and sneezing is a predominant feature. Pain is irregular in character, more often absent in the nose itself, but headache is common, as referred from sinuses and nerve lesions involved, and particularly nocturnal pain, frequently with earache. Involvement of the sinuses usually occurs to greater or less degree, often as a pan-sinusitis, which according to Graham, under X-ray examination has a blotchy appearance with scattered light areas, these as often in lower as higher areas of sinuses examined. Pus is not present and sinus tenderness is absent. The periosteal thickening is present and will remain. This may frequently account for many of the plates which later show apparent sinus involvement, but fail to demonstrate it under operative exploration. Graham has also emphasized the color changes in the mucous mem-

brane and the pain reference of nerve lesion. The luetic membrane has a dusky bluish red tinge as contrasted with the angry red of streptococcus infection or the sluggish red of the smoker's membrane, indicating truly the encroachment to out-flow of venous blood. Shrinking by cocain and adrenalin applications do not cause this bluish tint to disappear as in other acute conditions. The referred pain from sphenoidal to the ear or back of the head, the frontals to the top of head, enlarged turbinates to heavy pain above the eyes and olfactory loss of sense of smell, are cited.

It is fortunate for the rhinologist, who encounters this group of obstructive symptoms in minor degree and fails to give his patient relief, that other secondary manifestations appear and erythema, roseola, and papular skin eruptions or mucous patches in the oropharynx gave him aid. Tertiary lesions produce more evident changes. Perforations in the palate and septum, complete blocking in the nasopharynx and depression of nasal bridge are characteristic and self-evident. Multiple perforations in the soft palate in two of the writer's cases, who had not the slightest personal suspicion of syphilis, gave positive Wassermanns. The perforative possibilities in former septum and tonsillar operations must not, however, be overlooked.

Given this array of symptoms suggesting laboratory study, Wassermann, biologic animal teat, therapeutic administration of mercury and iodids, and microscopic search for the organism, there still remains the border line conditions and concomitant presence of tuberculosis, benign or malignat conditions grafted on a former specific history. The differential study of tubercular and specific ulceration has already been discussed. X-ray examination of sinuses will present reasonably characteristic evidences of changes involved. The widely placed teeth and sloping molars and radiating scar lines of congenital lues are helpful in diagnosis, and according to Kilpatrick, are often present when Hutchinson's teeth are not. He also emphasizes, first, the copper colored band across the fauces and soft palate, sometimes extending up to the hard palate and ending abruptly like erysipelas, as being pathognomonic of toxemia—this with other suspicious evidence, points to syphilis; and, second, the red border or fringe on the gums. With the absence of ptyalism and insalivation or Riggs' disease with its pus and bacteria, the probability is syphilis.

Benign neoplasma, fibrous, osseous lipomatous and cartilaginous are slower in onset and unless discovered late with already present surface erosion, do not confuse the diagnosis. Another condition not entirely in this field, yet in border line proximity is Vincent's angina and its type of ulceration. Demonstration of the spirillum and

fusiform bacillus are of course here of paramount importance and must be obtained for final diagnosis.

In matters of diagnosis, possibly the nasal septum deserves some special consideration. The presence of a perforation in the bony portion, possibly involving both vertical plate and adjacent portion of vemer, at once suggests syphilis, and very properly so, and yet we occasionally see cases, both of perforation of the bony septum and of iritis which we are convinced are not specific. Old traumatic and previous operative injury must be carefully eliminated as well as such conditions as post-typhoid ulcerations and tubercular invasion. This is treading on the hallowed ground of historic views, as positive as Koch's postulates, and is ventured here in suggestion only.

In the analysis of submucous thickening of the septum suggesting possible gumma, Prenn advises an X-ray of the septum which should demonstrate the loss of substance due to gumma, and Salinger suggests the careful study of relative presence or absence of concavity opposite, to eliminate septal deflection, which may at the same time have considerable thickening from intra-septal effusion of traumatic origin.

The surgical relations in specific rhinitis are of considerable importance. Chief among the symptoms of congenital syphilis (according to Ginsburg) appearing 50 per cent in the first year, and according to McKenzie 33 per cent under six months of age) are nasal blocking and snuffles and difficulty in nursing. This of course suggests at once adenoids, and these are usually presnt. Operating in cases of latent syphilis has perhaps the same danger as the administration of arsphenamine in stimulating endotoxin activity, and may produce reaction of serious general and neural consequence. The writer in his early practice has observed two cases of serious breaking down of the septum after apparently perfect healing. These appeared sometime later, both of them with very evident luetic pictures, a condition which did not appear at the time of surgical intervention. It was a great surprise to find the septum completely gone in one case and largely so in the other. This was very depressing after hearing a paper on the submucous resection by one of our otolaryngologists, citing 1400 operation on the septum without a single resultant perforation. Difficulty in submucous elevation and unusual inflammatory evidence should suggest a clinical examination for lues; nasal adhesions have fallen under luetic ban, but are more likely due to faulty intranasal operation or treatment. The treatment of syphilis, once definitely recognized, is not limited entirely to internal administration. Conservative topical measures to prevent further encroachment and deformity are always in order—cleansing, even mildly cauterizing

agents; every effort should be made to prevent the atrophic degeneration and infective reactions following necrosis.

Jacques has discussed diffuse polypoid elevations, apparently granulomata, in type, found all over the ethmoid area, vegetations, grayish yellow but in tint distinguished from ordinary polypoid degeneration by their diffuse location, relatively firm consistency and lesser mobility. In addition to the usual tertiary type, this hyperplastic alteration of slow evolution is possible, playing the role of rather benign pathogenesis of mucous membrane. The velvety and elastic feel has been considered characteristic of nasal lesion. Lymph adenitis with Vincent's angina and glandular involvement accompanying primary and secondary syphilis, both aid and confuse the diagnosis.

Enough has been indicated in this review to convince of the difficulty in diagnosis, especially of comparatively latent syphilis. Nasal stenosis, character of secretion, pan-sinusitis, peculiar referred type of pain with loss of appetite and earache, suggest clinical, differential and laboratory diagnosis.

There remains still another phase and that is the ethical handling of the patient. If one could easily obtain Wassermann and full study of all cases presenting obstinate rhino-pharyngeal trouble, the course would be simple. On the vague suspicion present in partial types, such course is often impossible and offensive to the patient. The writer has sometimes found it an advantage to obtain this in combination with simple blood culture and intravenous method of taking coagulation time.

If there be evidence of focal infection in the upper respiratory tract a leucocyte and differential are always in order, and blood for examination can be taken at the same time. If this be negative, no social damage has been done.

A study of the rhinologic area cannot but stimulate more careful analysis of obscure conditions and early internal therapeusis. A full appreciation of the possibilities of nasopharyngeal lues will be one means, at least of limiting tedious and unproductive office attention. Every patient discharged cured is the otolaryngologist's strongest defense.

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2117 Chestnut St.

SYPHILIS IN RELATION TO THE NERVOUS SYSTEM.

Dr. Charles S. Potts, Philadelphia, Pa.

Syphilis is a frequent cause of lesions of the nervous system, but probably not so frequently as many practitioners suppose. Apparently it is thought to be the only cause by some, if we judge from their therapeutics. Nonne[1] states that from 1903-1907 he examined about 15,000 cases of nervous disease and the diagnosis of syphilis of the nervous system was made in 1.25 per cent of this number, tabes and paresis not being included. He also states that it occurs about twice as often as brain tumor and multiple sclerosis, neither of which are common diseases. The latter, however, is more common in Germany than in this country. From 1908 to 1919 Nonne, in the last German edition of his book, states that he examined 11,136 cases of disease of the nervous system. He made the diagnosis of neurosyphilis 181 times or in 1.6 per cent, tabes dorsalis 321 times, and paresis 192 times, or a total of 6.2 per cent in which the disease was due to syphilis. Redlich in a large number of cases attributed the condition to lues in 14 per cent. It seems apparent that the various laboratory procedures which have been developed since 1903 have not increased the number of cases so diagnosed to a great extent. By laboratory methods I mean the determination of the Wasserman reaction in both the blood serum and the cerebrospinal fluid, the colloidal gold test and estimation of the number and character of the cells and amount of globulin in the latter. A normal cerebrospinal fluid should not contain more than ten lymphocytes, the average is probably from three to five.

It may be stated here that an examination of the blood is not sufficient in a doubtful case for diagnosis, while that of the fluid in addition to its aid in daignosis may be a valuable guide to the efficacy of our therapeutics. Drawing off of the fluid may also be an efficacious aid in treatment. As will be mentioned in more detail later, examination of the C.S.F. shows involvement of the nervous system when clinical symptoms are absent.

This examination, however, sometimes leads to errors on the other side. Because a patient either is known to have had syphilis or the Wasserman reaction is positive, it does not always follow that the symptoms from which he is suffering are due to syphilis; thus, recently I have seen a man with a tumor of the spinal cord verified by operation, who had been treated as a case of spinal syphilis for the past five years.

It is important to remember that the clinical symptoms are the main thing after all and this becomes more significant when we remember that this disease may be present with a negative serology. Any or all of the indications of syphilis found in the blood and cerebrospinal fluid may be absent in some cases. On the other hand, positive Wasserman reactions have been obtained when there was no syphilis. As regards this reaction, Strickler[2] has formulated these conclusions, which seem to me to be correct: *1*, A negative Wasserman test in the presence of definite syphilitic lesions is a possibility in certain stages of the disease. This may occur at times in tertiary syphilis, inherited syphilis and certain types of neurosyphilis; *2*, a positive Wasserman test in the presnce of nonsyphilitic disease should not always mean syphilis. It should, however, arouse our suspicion to study our patient from every conceivable angle in our endeavor to explain this positive reaction. It should be borne in mind that a syphilitic patient is subject to any and all ailments that a nonsyphilitic is heir to. *3*, While a strongly positive Wasserman reaction in a subject who is not suffering from any illness should cause us to investigate, nevertheless, too great strain is not to be put on it, unless this finding is confirmed by a number of reliable laboratories.

It seems to me also that weak positive reactions in those who are not known to have had the disease or who have not been undergoing treatment for it, should always be regarded with skepticism unless confirmed by other observers.

The foregoing remarks may seem to be putting the cart before the horse, but have been made in an endeavor to counteract the tendency of so many, to rely on this test almost exclusively for a diagnosis. I recognize its value, but regard the clinical symptoms as more important.

What then are the lesions in the nervous system caused by syphilis and what are the symptoms which indicate its presence? The former may be classified under five heads: *1*, disease of the blood vessels; *2*, chronic hyperplastic inflammation or gummatous meningitis; *3*, new growth or circumscribed gumma; *4*, degeneration of nerve fibres and cells or primary parenchymatous degeneration; and *5*, simple meningitis and encephalitis.

Disease of the blood vessels may be the only lesion or it is associated with different forms of gummatous inflammation. The common condition is the so-called endarteritis obliterans in which the lumen of the vessel is either greatly narrowed or obliterated by thickening of the intima by cellular proliferation. This leads to thrombosis in the vessel and softening in the areas supplied by it.

The basal cerebral arteries are mostly affected. Gummatous nodes due to round cell infiltration of the vessel walls, the so-called arteritis or periarteritis gummosa, may rarely occur. Furthermore, the function of the vessels may be interfered with by the pressure of gummatous growths which leads to softening of the nerve tissues, and a peri-, meso-, or pan-arteritis may occur by extension from a gummatous process. Rarely, aneurysm of the cerebral vessels, usually either the basilar or middle cerebral, may result. Similar conditions in the veins occur.

Gummatous meningitis may involve all three membranes or be limited to either the dura or pia-arachnoid. If the former, the involvement is often due to spreading from a leutic osteitis or periostitis. In any event the pia-arachnoid soon becomes affected. The membranes are thickened and adherent to each other, the perivascular sheaths are infiltrated with lymphocytes and plasma cells, there is thickening and proliferation of the connective tissue, especially of the dura, round cell infiltration of the pia-arachnoid, and more or less peri- and endarteritis. Due to the disease of the blood vessels, areas of softening in the brain itself are present. Conditions such as described affect the vertical meninges but more frequently a leptomeningitis of the base occurs. This is most apt to develop in the interpeduncular space and region of the optic chiasm. Minute circumscribed gummata may be seen along the course of the blood vessels and areas of softening due to vascular disease also occur. The peri- and endoneurium of the cranial nerves, especially the ocular and auditory, are infiltrated with round cells. Such infiltration may involve both spinal and cranial nerves independently of meningitis causing what is essentially a syphilitic neuritis. These lesions at one time were regarded as tertiary phenomena. We now know that gummatous meningitis may occur in the secondary period. Cranial nerves may be affected at this time also, either by involvement in the meningitis or by round cell infiltration of the nerve sheaths and fibres. In a case of syphilis of the eighth nerve recently reported by Lloyd[3], in addition to round cell infiltration there was degeneration of the fibres, all occurring within six months after infection. The eighth nerve is especially liable to be affected at this time, in fact cases have been reported as occurring during the primary stage. Other cranial nerves involved, in order of frequency, are the second, seventh, third, fourth, fifth, and sixth.

Circumscribed gumma occurring alone is not so frequent in my experience as the conditions just mentioned. When present it acts as a tumor and causes symptoms both by pressure and irritation. It springs from either a blood vessel or the meninges and sometimes

extends outwards, involving the skull but usually extends along the pial sheath of the blood vessels into the brain or cord. Similar lesions to those just described occur also in the spinal cord and its meninges. The dura of the cervical region may be greatly thickened, as in the hypertrophic cervical pachymeningitis of Charcot and Joffroy. This may be due to other causes than syphilis.

Parenchymatous degeneration causes what used to be known as parasyphiltic diseases, that is, those which are due often, but not always, in some obscure way to syphilis, and in which the lesions are not those characteristic of it. We now know that in these diseases some of the characteristic lesions are found. That is, there is cellular infiltration and involvement of meninges, but in addition there is a primary death of nerve cells and fibres in either the brain, cord, peripheral nerves, or all combined. Spirochetes have been found in the nerve tissues in some of these conditions. Some, as tabes and paresis, without doubt are always due to syphilis; others, as the muscular atrophies, only some cases.

Simple meningitis has not been regarded by all as a syphilitic lesion. Recent observations seem to show that it not infrequently is. This brings us to the interesting questions of the early involvement of the nervous system, neurosyphilis asymptomatica and neurorecidives. Ravaut as long ago as 1903 showed that patients with secondary syphilis frequently had abnormal cerebrospinal fluids as shown by pleocytosis and other pathological changes. A number of observations have been made along these lines with the result that it seems evident that a good proportion of cases, even before secondary symptoms have appeared, have either pleocytosis, increased globulin, a positive Wasserman, or all combined. Klauder[4] has demonstrated the spirochaeta pallida in the fluids of fourteen cases of primary and secondary syphilis. Fildes, Parnell and Maitland[5] examined a large number of such cases, who showed no obvious signs, for the presence of clinical evidence of such involvement. In a considerable percentage they found such symptoms as dizziness, headache, slight weakness of the facial nerve, ocular palsies and abnormality of the eye grounds, which was termed a slight choroidal endarteritis and retinitis. One of these cases had 1000 cells in his fluid, but was doing active duty in the navy and was sent to the hospital on account of the secondary rash. Many had auditory nerve involvement but as all of these patients were naval men during the war, the question of doubt as to how many might be due to gun fire arose and they were not included. They believe that the symptoms are due to a meningitis not gummatous, as some may have an opalescent spinal fluid containing polymorphonuclear cells. Many other cases with abnormal cerebrospinal

fluids presented no clinical signs. Klauder[4] terms such neurosyphilis asymptomatica. Lang stated in 1881 that "an organ which is the seat of a gummatous lesion must have been affected in the early period of syphilis" and McIntosh and Fildes[6] in 1914 stated that "a gumma was due to a recrudescence in a remnant of spirochaetes which had remained dormant in situ since the generalization during the acute stage". Fortunately, in many of these cases the spirochaetes either remain dormant or are killed by treatment as symptoms referable to the nervous system are never devloped. In a number of cases in this period, the colloidal gold test may show the "paretic curve". This was supposed to indicate that later such patients would develop paresis. This I believe has not been borne out.

It is well known that patients apparently free from symptoms referable to the nervous system may develop them after a dose of arsphenamin (provocative injections). Cranial nerve involvement, especially of the seventh and eighth, is especially prone to occur. Headache and other symptoms of meningitis may develop. This is known as a neurorecidive or neurorecurrence. In these cases the blood and spinal fluid Wasserman before the injection may be negative, afterwards pleocytosis and a positive Wasserman develops. Klauder[4] regards these as a form of Herxheimer reaction.

Disseminated areas of encephalitis have been found in syphilitic brains independent of the usual syphilitic processes. Several cases are quoted by Nonne.[7]

Syphilitic disease of the vertebrae and skull may also cause symptoms referable to the nervous system. Meningitis may start from this point or nerve roots may be involved. Headache may be due to a periostitis.

The lesions due to acquired syphilis may also occur in the hereditary form.

An interesting question in regard to neurosyphilis is why do some get it while the majority do not, and why do those inoculated by a neurosyphilitic develop it, as in the numerous examples of conjugal neurosyphilis reported? For instance, the writer knows a family in which the father was first infected, developed paresis, the wife and three children are tabetics. Evidence has accumulated by the work of Marie and Levaditi,[8] Moore and Kemp,[9] and others tending to show that there is a neurotropic strain of the spirochaete, which causes the parenchymatous form of neurosyphilis. Among other evidence of this is the fact noticed by all that victims of this form as a rule have had very mild or absent secondary symptoms. It should be stated that this view is not yet universally accepted.

From the character and distribution of the lesions it is evident that the symptoms of neurosyphilis are many. They seem, however, as a rule to follow types that can be recognized clinically. It is not possible in this paper to detail all the symptoms, but it may be well to detail the early and characteristic ones. A modification of Dana's[10] classification of the clinical manifestations is as follows:

1 Prodromal syphilis.

2 Meningo-vascular or exudative syphilis (hereditary and acquired.)

(a) *of the brain*

CLINICAL SYMPTOMS	ANATOMICAL CHANGES
Severe headache, vomiting, vertigo, mental dullness, irritability, attacks of somnolence or coma, convulsions, cranial nerve palsies, optic neuritis, hemiplegia, brain stem and bulbar palsies.	Syphilitic meningitis, arteritis and phlebitis.

(b) *of brain and cord.*

many of the symptoms as above with paraplegia.	Meningitis, diffuse, disseminated or localized. Meningo myelitis.

(c) *of spinal cord.*

Paraplegia, Brown-Sequard paralysis, muscular atrophy, spastic paraplegia and ataxia.	Meningo-myelitis, gumma, localized softenings from obliterative arteritis.

(d) *of nerve roots and nerves.*

Cranial nerve palsies, cauda-equina symptoms, local palsies of peripheral nerves. Multiple neuritis.	Root neuritis, gummatous neuritis.

3 Parenchymatous or degenerative syphilis (hereditary and acquired.)

(a) *of the brain.*

Paresis, optic atrophy, bulbar palsy.	Meningo-encephalitis, degeneration of cells and fibres

(b) *of the cord.*

Tabes dorsalis, spastic paraplegia, progressive muscular atrophy.	Meningitis, disseminated myelitis, and degeneration of nerve cells and fibres.

(c) *of the brain and cord.*

Tabo-paresis, combination of (a) and (b).

4 Combinations of meningo-vascular and parenchymatous.

All of these symptoms do not occur in any one case. Pure spinal syphilis rarely occurs and cerebral symptoms, as fixed, unequal and irregular pupils are present. This fact is of great assistance in the recognition of doubtful cases of spinal cord disease.

The most common prodrome is headache, which, as a rule, is worse at night, in fact may be absent during the day, when the patient is more or less somnolent. During the night, he may wander aimlessly about in a condition graphically characterized by H. C. Wood as "a restless nocturnal automatan rather than a man". Examination may show cranial nerve involvement, especially of the extra-ocular, auditory and optic. Kaplan gives the average serology of such cases as follows: cells 80-200, extremes 0-2000, positive Wasserman in C. S. F., 65 per cent, globulin excess in 65 per cent, colloidal gold 2 per cent, positive Wasserman in serum, 80 per cent. The absence of cells is usually found in the pure vascular types. In these either cerebral apoplexy or softening in the spinal cord giving symptoms of myelitis are the usual occurrences. In both the vessels become blocked by thrombi, followed by softening. Cerebral apoplexy occurring before 40 years if a source of embolism can be eliminated or a previous acute infectious fever has not been present is almost surely luetic. Epileptiform convulsions occurring after 35 years are apt to be, although there are many other causes for such. It may also be the factor in those occurring in early life. They may occur before or during the secondary stage. In this connection it might be well to state that ocular symptoms resembling those of syphilis may exist permanently after an attack of epidemic encephalitis. The stupor of this disease may also be mistaken. The history is therefore very important.

Among the parenchymatous types, progressive spinal muscular atrophy, lateral and amyotrophic lateral sclerosis may be sometimes so caused. Paresis and tabes dorsalis always are. The first symptom of paresis may be either an epileptiform convulsion or transient apoplectic attacks. In others, neurasthenic symptoms predominate. It may be some time before the well known "delusions of grandeur" appear. Frequently they never do, the mental state being often one of absence of worry and feelings of responsibility when such should be present. Examination in the earliest cases will show pupillary anomalies, some tremor of face, tongue or hands, speech defcts and changes in the tendon reflexes. According to Kaplan, the average serology is: cells 18-35, extremes 0-250, Wasserman reaction present in C. S. F. in 85 per cent, excess of globulin in 75 per cent, paretic curve in colloidal gold test, 95 per cent, Wasserman reaction, positive in the serum, 95 per cent.

The earliest symptom of tabes dorsalis in most cases is pain, usually of the lancinating or shooting type. It is commonly present in the legs, but may be in the arms or face. This may be present for years before other symptoms are apparent and such cases are often treated for either rheumatism, neuritis or neuralgia. Examination will show pupillary anomalies, absence of tendon reflexes, especially the patellar and achilles, and probably loss of or diminished vibration and pain senses in the legs. Other early symptoms, whose true nature is often not recognized are those due to gastric crises. Laryngeal crises characterized by spasmodic fits of coughing with inspiratory stridor, feelings of suffocation and cyanosis are not uncommon. Paroxysms of sneezing may also occur. Examination of the larynx between the attacks is usually negative. Paralysis of laryngeal muscles may, however, be a symptom of tabes. Pharyngeal crises consist of rapid involuntary movements of deglutition accompanied by a gurgling or gulping noise. Pressure on the side of the larynx may precipitate attacks. Kaplan states that the average serology of tabes is: cells 35-60, extremes 0-350, Wasserman reaction positive in the C. S. F., 40 per cent, globulin excess in 33 per cent, Wasserman reaction positive in serum, 65 per cent. He states that the colloidal gold test is negative. This is not my experience and the so-called "luetic curve" is frequently found.

It is an important thing to remember that in hereditary lues, the symptoms may appear in middle life. It is also true that the symptoms of neurosyphilis rarely develop in old people. The fact that trauma seems to excite luetic lesions in those predisposed is important. Of the manifestations of neurosyphilis, paresis is the most likely to be so excited.

The prognosis in neurosyphilis is not hopeless. It is worse in paresis than in the other manifestations. Like every other disease some respond readily to treatment, others in spite of it go from bad to worse. Under modern methods, many cases of tabes are much improved and the progress arrested. It must be remembered that where actual dstruction of nerve cells and fibres occurs, they cannot be restored; therefore, especially in apoplexy due to syphilis, as from other causes, paralysis may remain. Also the healing of gummata and gummatous meningitis may leave scars and fibrous thickening of the meninges which act as sources of irritation to nerve cells. Patients may improve clinically in spite of the persistence of positive Wasserman tests. Some cases known as the "Wasserman fast" may keep well indefinitely with persistent positive reactions. The cell count, if increased, usually diminishes under treatment.

In conclusion, while I have said nothing about treatment, I wish to

emphasize that mercury should always be used, and as a rule for a time before the administration of arsphenamin. Herxheimer reactions are thus avoided.

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2018 Chestnut St.

ACUTE MASTOIDITIS.

Dr. Margaret Noyes Kleinert, Boston, Mass.

There have been cases of acute mastoid infection and operation without involvement of the middle ear. But as they are yet considered rare enough to report I will place this case on record.

Case: Dorothy L., age 1 year and 3 months, entered the New England Home for Little Wanderers, June 30, 1924, with a history of swelling, of three days' duration, behind the right ear. There had been no discharge from the canal at any time.

Examination showed a large swelling over the mastoid, largest at the upper level of the external ear. The canal contained a small amount of normal cerumen which after removal showed the drum

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white and thickened and no perforation. There was no cone of light.

Past history was that the child received a cut behind both ears at birth from instrumental delivery. However no scar was observed. At about 6 months old the child was reported to have had a "rectal abscess", which must have healed quite promptly because at examination made at the Home less than a month afterward the rectum was reported normal.

Present illness: The child had been crying a little for a few days and at the same time the foster parents noticed a swelling behind the right ear. At entrance there was a temperature of 101°, which dropped to 99° the next morning. Physical examination showed a well nourished child, in no pain.

Operation: The usual mastoid incision was made behind the right ear. The periosteal elevator used. Pus was immediately seen in two locations coming from the bone. One perforation was posterior to the spine of Henle, the other a half-inch directly above. A curette was used to remove the bone and a softened mass of cells and pus was scraped out. The whole shell of the mastoid was exposed, extending high up to the floor of the middle fossae. A probe passed through the aditus into the middle ear brought no pus. The wound was lightly packed and three skin sutures placed. With the usual care of the wound the child was sitting up and apparently quite happy the day after the operation. On the fourteenth day after the operation the wound was healed, and after the seventeenth day no dressings were required.

The drum membrane was the same as before the operation. There was no pus through the canal at any time.

82 Commonwealth Ave.

OUR NEW CONTEMPORARY.

The new *Archives of Oto-Laryngology,* published by the American Medical Association under the direction of a specially selected editorial committee, makes its first literary and scientific appearance with the issue of January, 1925.

We welcome this new contemporary in the journalistic field; we compliment the editors on its dignified and well-arranged scientific subject-matter, its array of substantial original contributions, its elegant typography and clean press-work.

The names and reputations of its editorial committee vouchsafe an auspicious career for this new monthly and if its tone and scientific standard is uniformly maintained thru the storms, experiences and vicissitudes, as they are bound to occur, in the life of any publication in medical literature, we bespeak for it an eventful and interesting career.

Force of example is a potent thing, even in the realm of journalism, and, if we may be pardoned an egotistic allusion to over a quarter of a century of honest, unselfish and non-political effort in this field, as demonstrated by the *Annals of Otology, Rhinology, and Laryngology* and THE LARYNGOSCOPE, the standard to be maintained by our esteemed contemporary must be a high and unselfish one and must show, on the part of the editorial committee devotion, altruism and a constant desire to assist in the upbuilding of American oto-laryngology. Heartiest congratulations! M. A. G.

A NEW NASAL SPLINT.

Dr. Francis W. White, New York.

Due to the fact there is a multiplicity of nasal splints, the addition of one more to the list will do no harm. Every splint so far devised has one or more objectionable features. The one the writer is reporting is composed of No. 16 mesh pure copper screening (mosquito netting). This screening is light in weight, porous, easily moulded, and is of such resiliency as to retain its shape after moulding. The only other things necessary are adhesive plaster, cotton and collodion.

The construction of the splint is simple. A piece of screening more than large enough to entirely cover the nose is placed in position and then by means of heavy shears is cut so as not to allow any pressure to be exerted upon the lower eyelids either during or after the moulding. After perfect moulding if the strip is too long or too wide more is cut away. The splint should not be too narrow as it must extend a sufficient distance over each cheek to obtain adequate support for the nose. All edges of the splint are overlapped with adhesive plaster to prevent the sharp-pointed wires from sticking into the flesh. The next step is the lining of the splint with a thin layer of cotton. The splint is now ready to be held in place permanently. This is accomplished by applying evenly by means of a camel-hair brush ordinary collodion over the entire uncovered surface of the screening in sufficient quantity to soak through the cotton and appear in excess in the mesh of the screening. Great care must be exercised to prevent injury to the eyes. In a few seconds the splint is securely fastened, holds the parts immobile, and may be left in place for a week or longer. Access to the nasal cavity is easy for the introduction of packing, for cleansing purposes, or for the application of medicaments. It is not excessively unsightly, and does not interfere with vision or mastication. Due to its lightness, movements of the head are as free as normal. If necessity demands, the splint may be removed, relined, and replaced without discomfort. An abrasion or other open wound may be treated directly through the mesh by *not* lining the splint at that particular place.

174 West 58th St.

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A NEW LARYNGEAL SYRINGE.

Dr. David Rathburn Higbee, San Diego, Calif.

It very frequently happens in the practice of the laryngologist that adequate medication in the larynx is made exceedingly difficult by spasm of the pharyngeal muculature.

The topical application of cocain is a method of overcoming such difficulty but many patients do not tolerate even the small quantity of the drug necessary to bring about this reduction of the threshold of sensory stimulation.

I have encountered a large number of individuals who could tolerate the laryngeal mirror, but when both mirror and syringe were used and the tongue held in the necessary extended position, gagging rendered precise medication impossible.

The syringe has been devised to more easily effect treatment in the cases where a general application to the larynx is desired.

The curve of the syringe is one of the most important features. It exactly parallels the curve of the base of the tongue and enters the larynx behind the epiglottis in the line of its perpendicular axis.

The glass tubing is very thick walled, insuring against accident. No perforation is made at the tip of the syringe but four small perforations are drilled into the lumen from the periphery. The solution from the syringe is directed onto the mucosa of the larynx, from which position it gravitates onto the cords and remains in contact with the entire membrane.

Any desired quantity of solution may be drawn into the syringe and gauged accurately which is a great advantage over the metal syringe.

It is unnecessary to use the laryngeal mirror or to apply cocain when medicating the larynx with this syringe as the procedure can be carried out so quickly and accurately that it is well tolerated.

The syringe is inserted in the mid-line over the tip of the epiglottis. During this movement the barrel of the syringe is near the lower teeth. After the end of the syringe has passed over the tip of the epiglottis the barrel is raised against the upper teeth

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throwing the end of the syringe forward in the direction of the larynx.

This syringe is made and offered to the profession by Becton, Dickinson & Co., Rutherford, N. J.

409 Watts Building.

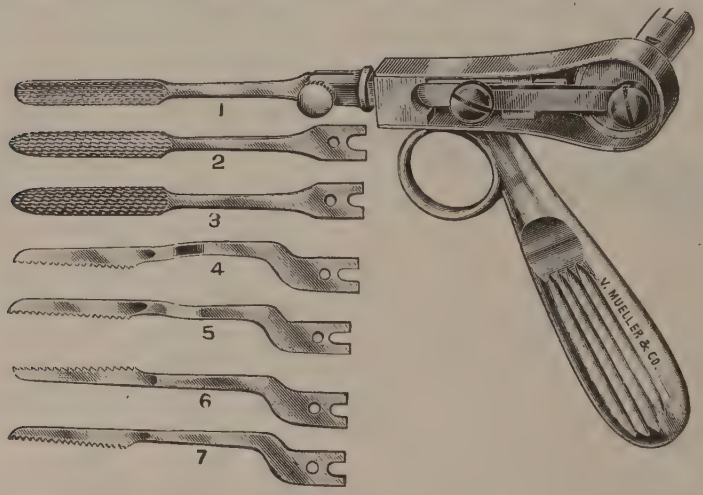
AN ELECTRICALLY DRIVEN NASAL SAW AND RASP.*

Dr. Samuel Iglauer, Cincinnati, Ohio.

The accompanying illustration represents a modification of the electrically driven intranasal saw designed by the late Dr. Pynchon.

The instrument as modified is devised for the correction of external nasal deformities. With the use of this instrument the time consumed in operation is materially shortened.

The length of the stroke of this instrument can be adjusted and the apparatus is well balanced so that there is very little vibration.



The accessories consist of one concave, one convex and one flat nasal rasp, Figs. 1, 2, 3, and four Joseph's saws, Figs. 4, 5, 6, 7, and of one straight saw not shown in the illustration.

Since the above illustration was made the receiving end of the hand piece has been split in chuck fashion so that the accessories may be set into this chuck at practically any angle desired.

The hand piece is operated by an electric motor preferably controlled by a foot switch. The instrument can be readily sterilized, and should be lubricated with sterile vaseline or oil.

400 Pearl-Market Bank Bldg.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

March 26, 1924.

PROGRAM GIVEN UNDER AUSPICES OF THE POST-GRADUATE HOSPITAL.

I. Reading of Minutes.

II. Presentation of Patients.

a. Argyrosis—Two Cases Accompanying Chronic Sinusitis. Marvin Jones.

b. Supposed Novocain Poisoning. Dr. T. J. Harris.

c. Bone and Cartilage of the Tonsil, Persistent Bleeding Following Removal of One Tonsil (Lantern Slides). Milton Reder.

d. Carcinoma of the Tonsil Treated with Radium. Martin Ross.

e. Implantation of Stenson's Duct Into the Antrum for the Relief of Dry Fetid Catarrh. J. Eastman Sheehan.

f. Removal of Stenson's Duct from the Right Antrum by Plastic Methods, and Its Mechanical Counterpart. J. Eastman Sheehan.

g. Operation for Extensive Phenol Burn of the Left Lids, Eyeball, Upper Face, and Temporal Area. J. Eastman Sheehan.

h. Hodgkin's Disease with Nasal Manifestations. Thomas J. Harris.

i. Carcinoma of Cervical Glands Secondary to Carcinoma of Esophagus. Julius Klepper.

j. Fibro-sarcoma of superior Maxilla and Nasopharynx. Operation Two Years Ago, Followed by Radium Therapy. Duncan Macpherson.

III. Paper of the Evening: Plastic Repair of the Syphilitic Nose (Lantern Demonstration). J. Eastman Sheehan.

IV. Report of Cases.

a. Carcinoma of the Trachea, Secondary Involvement of Esophagus Causing Unilateral Recurrent Nerve Paralysis. Thomas J. Harris, Henry Hall Forbes.

b. Hemiplegia Forty-eight Hours After Submucous Resection of Septum. Morris Rosenthal.

c. Foreign Body of Neck. J. Eastman Sheehan.

V. Presentation of Specimens.

Anatomical Specimen Showing Vessels Usually Injured in Ethmoidectomy. Simon Ruskin.

VI. Executive Session.

Argyrosis—Two Cases Accompanying Chronic Sinusitis. Dr. Marvin Jones.

(Published in full in this issue.)

DISCUSSION.

DR. IMPERATORI said that he had seen both cases some three or four months previously. Since that time, there has been a marked improvement in both patients.

At that time the young woman had a peculiar appearance, almost like a fadeout in a moving picture.

DR. MACPHERSON said the cases were very peculiar but that probably more of them would be seen. About a year ago a man came to him with the statement that eight years previously he had been told to use argyrol for a cold and had since then taken it every time he had a cold. Within the past two years he had developed a rectal trouble and had some work done for hemorrhoids; the wound was treated with argyrol, and immediately his skin was affected. A great many persons are using argyrol for their children's colds, and in all probability more of these cases will be seen.

Dr. Forbes asked if any difference had been noted in the staining by argyrol or by the silver salts.

Dr. J. D. Whitman said that two weeks earlier, at the Manhattan Clinic he had seen a young woman who had used a 5 per cent solution of argyrol three times a day for several years, and the entire mucous membrane of the nose was colored a dark bluish black. The pharyngeal mucous membrane was also discolored to a lesser extent.

Dr. Jones, replying to Dr. Forbes' inquiry, said that references to the subject in the literature were very scanty; the only things he had found were in Jackson on the Skin and another skin work, containing a very short paragraph. The best information was found in a book on therapeutics by Holmes, an Englishman, who said that the injurious effect from applying it was extremely rare, and that most of the cases came from injecting the argyrol. None of these works mentioned that there was any difference noted between the effects of argyrol and silver nitrate salt.

Supposed Novocain Poisoning. Dr. T. J. Harris.

(Published in full in this issue.)

DISCUSSION.

Dr. Knopf wondered whether there was any allergy to this type of poisoning, and said he had been informed by a dentist friend of a persistent dermatitis on his hands from novocain poisoning.

Dr. Sheehan *said*: "Dr. Harris, my attention has only been brought to this case of novocain poisoning today and I am sure that you have not been acquainted with the fact that I was the first consultant called upon. I happened to be lecturing in the hospital the day a combination of novocain and cocain was administered to this man, and would have brought this to your attention sooner if I had known this particular case was to be reported as one of novocain poisoning.

"Dr. William Newcombe asked me to see the man in the clinic who, he said, had been given topical application of cocain and had several drachms of novocain injected into the tonsil area to produce local anesthesia. I found the man apparently in the second stage of cocain poisoning, that is, he had a rapid pulse of some 160 beats per minute, was cyanotic, confused, with marked forehead perspiration. He never impressed me at the time as suffering from novocain poisoning, for although novocain is about five times less toxic than cocain, when patients are posoned with this drug, symptoms come on more abruptly, and the heart and lung centers are more quickly affected. Patients do not pass through three stages of reaction as in cocain poisoning, which, you know, are first, a period of elation, great excitement, second a period of depression and syncope, and finally the last stage, a period of convulsions, which, whilst the poison is generally combatted before this stage is reached, still, if the period of convulsions does set in, it generally proves fatal."

Dr. Harris emphasized the fact that the case was reported as one of supposed novocain poisoning, and repeated the statement made by Dr. Emil Mayer that there is not on record an authentic case of novocain poisoning, and that in every such case it would be found that cocain had been used with it. At the Post-Graduate extreme care was exercised in the use of cocain and the amount was carefully controlled, and he would be very sorry to have this case go out as a case of novocain poisoning.

Bone and Cartilage of the Tonsil; Persistent Bleeding Following Removal of One Tonsil (Lantern Slides). Dr. Milton Reder.

(Published in full in this issue.)

DISCUSSION.

Dr. Carter recalled two cases seen about fifteen years ago; one being a child and the other a young adult. In one, bone was found in one tonsil, and in the other it was found in both tonsils. Both cases were

reported before the Laryngological Section of the New York Academy of Medicine. Dr. Jonathan Wright made a micriscopical study of the cases at the time and his findings are recorded in Dr. Carter's report.

A very interesting feature in these cases is the etiology, and this has not yet been fully determined. Of course those cases are excluded where the bone is the tip of an abnormally long styloid process; these do not concern us here.

There are two main theories to account for the presence of bone and cartilage in the tonsil: (1) That it is due to developmental changes in the remains of the second bronchial arch; and (2) that it is produced by metaplastic changes in the connective tissue of the organ. Both of Dr. Carter's cases seemed to favor the latter theory, as the successive stages from connective tissue through cartilage to bone could be distinctly traced.

Dr. Sheehan said that last summer he had an opportunity of discussing a paper on this subject from the standpoint of hemorrhage, while he was lecturing in Europe.

"These states are very interesting and some of my severest forms of bleeding from tonsil enucleation have been complicated by the presence of bone and cartilage. I shall never forget the incident which occurred in Sondermann's Clinic in Berne, Switzerland, some years ago. A young adult male was anesthetized and an attempt was made to enucleate the tonsils by the guillotine. The left tonsil was cleverly removed with ease, but in the case of the right one, a different condition presented itself. It was impossible to remove the tonsil by the guillotine. The tonsil was dissected from its bed, and before it was free, hemorrhage was quite severe. It was now found that bone forceps were necessary to cut through the extensive mass in the tonsil, after which hemorrhage became quite alarming. Since then I have never failed to examine the tonsils bimannually for these deposits.

For purposes of convenience the origin of these deposits may be grouped under two headings: 1. Extrinsic; 2. Intrinsic (Moore).

Extrinsic Group: Extend from skeleton to tonsils; the other, the intrinsic, originates in tonsils themselves. Extrinsic group generally from the styloid process or, as occasionally happens, supernumerary ribs. More frequent in males and in people over 45, as a rule.

Symptoms: The state may cause abnormal sensations in the throat, such as a feeling of impaction of bone or other foreign body, irritation and frequent sore throat—in some a continual impediment in swallowing. Sometimes there is a curious "clicking".

It is extraordinary how frequently one finds these deposits in the tonsils. *Intrinsic Group*: that is, those cases which developed in the tonsils themselves, is undoubtedly a combination of foetal rests and a special chrondro and osteoplastic predisposition on the part of the connective tissue cells to respond to inflammation. It has been my experience that when tonsillectomy is complicated with bone of extrinsic origin the bleeding is severest, as the circulation in the bone which has been tapped is very difficult to master on account of the great inaccessibility of the bleeding areas. It should be controlled, as bleeding from bone in any other part of the body is combatted, namely, by firm pressure. I find the most satisfactory way of arresting this type of hemorrhage is by taking dental moulding wax and plugging the whole tonsil area, and exerting pressure for a considerable period of time.

Dr. McCullagh said that probably most of those present had seen the report of Dr. C. V. Weller on the September (1923) number of the Annals of Otology, Rhinology and Laryngology, showing the very frequent occurrence of cartilage in the tonsils. At the University of Michigan they examined the tonsils of a thousand consecutive cases, ranging in age from 3 to 59 years, and almost 21 per cent showed cartilage in the tonsils. Of the cases above 25 years of age, 57 per cent showed bone or cartilage or both. Bone was never found without cartilage.

There are two theories to account for its presence:

1. That it arises by a process of direct metaplasia from the connective tissue, which view Weller supports.

2. That it springs from the primitive cartilaginous cells of the bronchial arches, a theory supported by Mantchik.

He then told of a patient, age 58 years, in whom there was a cartilaginous shell replacing the capsules of the tonsils.

DR. HARRIS complimented Dr. Reder on the very thorough manner in which he had worked up this subject. He had gone through a considerable number of cases at the Post-Graduate, and found several cases showing cartilage in the tonsil. His pictures spoke very strongly for the metasplasia theory, and it seemed as though you could see the connective tissue passing into bone. These cases do not seem to be so rare as has been thought. In a recent number of THE LARYNGOSCOPE eight cases were reported. Dr. Harris said he remembered very well how Dr. Jonathan Wright had worked up the subject. The hemorrhage seems to be the peculiar feature, and if there were some unusual source in a case like this which does not occur otherwise.

DR. REDER, in closing, said that there were 2,000 pathologial reports at the hospital, and in that number there was one other bone case and 200 cartilage cases, making about 10 per cent.

DR. HARRIS said that Dr. Ross had spent a great deal of time in the care of this case and in working it up. The discussion of the desirability or the wisdom of radical surgery was an important question; his judgment was good in not resorting to that; there was too much involvement; the disease had extended too far. It would profit all to hear of any similar esults. As Dr. Robinson was present, he might be willing to tell what results he had obtained with radium in the tonsil. There seemed to be a great deal of variance of opinion in regard to the difference in the appearance of sarcoma versus carcinoma, etc., and diathermy has been strongly urged for these cases; the surgeons are using it, particularly the G-U men, but in this case radium seemed to show very beneficial results, in spite of the defect. Much judgment, however, should be used in the amount of radium employed and in the length of the exposures.

Carcinoma of the Tonsil Treated with Radium. Dr. Martin Ross.

(Published in full in this issue.)

DISCUSSION.

DR. MARVIN JONES told of a case of sarcoma of the tonsil treated with radium by the late Dr. Willis, three radium needles being applied on three different occasions, 10½ mg. The case improved for a short time—for about three months—but about the fourth month developed a hemorrhage and died.

DR. IMPERATORI told of a case seen with Dr. Willis, some seven or eight months previously. The man had an extensive ulceration of the tonsil, with considerable infiltration of the tonsilar area. Biopsy showed it to be carcinoma. Radium was applied directly to the involved area, by the insertion of needles and a few weeks later an external bloc treatment was given. Three months after the first treatment another bleeding was done and within a few weeks another external bloc application of radium was done.

This patient was a race track bookie and did a great deal of talking and shouting. Examination of his throat within the last few days revealed no ulceration and most of the infiltration had disappeared. It would seem as though this patient was going to be cured. At all events he had gained some 15 pounds and presented an entirely different picture than he did some eight months ago.

In all these cases of carcinoma treated with radium or for that matter by any other procedure—we should wait for some years before reporting a case as cured, even though there seems to be a disapearance of the growth. However, it would seem as though we were on the right track, in the treatment of these tonsilar and pharyngeal carcinomas by the use of radium.

Dr. Ross said he had seen five cases of primary carcinoma of the tonsils and all were on the left side. That, to him, was rather remarkable, and as he had gone through the literature he noted that of all the cases published since 1910, which were corroborated by biopsy, 75 per cent of carcinomata occurred on the left tonsil, and 60 per cent of the sarcoma occurred in the right tonsil. He did not know whether or not that was simply a coincidence.

Dr. Carter said that he was interested in the prosthetic appliances shown and he hoped that they would be of assistance in the management of these cases, as they present some of the most difficult problems in surgery.

There are so many disadvantages to cope with; the general condition of the patient, the disturbed metabolism, the endarteritis, the scars of both soft tissues and bone. and the fact that the tissues of the syphilitic subject have low resisting power and their power of recuperation is far below that of the normal body. In correcting these deformities, if we have to use bone and cartilage transplants, we may be sure that these tissues have been affected by the disease.

When these cases present themselves for treatment it is absolutely necessary to get the patient in good condition before the operation. Dr. Carter said that he believed that it is unwise to operate upon cases that are not Wassermann negative, although he had done so on several occasions, but only because the demand for the operation was urgent, and only after he had been assured by the referring physicians that the patients had been given a prolonged course of treatment and that they could not be made Wassermann negative. Dr. Carter said that there were unquestionably some syphilitics who cannot be made Wassermann negative, even by the most approved treatment applied in a proper manner. He said that he had secured good results on the cases he had operated upon, but the risk in a Wassermann positive case is so great that he thought that the surgeon was fully warranted in making reservations as to prognosis in such cases.

Dr. Carter said that he saw no advantage in the so-called tubular method of making flaps, in fact there is a distinct disadvantage, for in doubling over the flap to make it into a tube the blood vessels in the subcutaneous tissue upon which we must rely for the nutrition of the flap, especially the extreme end when it is a long one, are constricted and the vitality of the flap is endangered. Dr. Carter said that instead of tubing the flap, he keeps the exposed raw surface well covered with vaselin, until the unused portion is returned to its former position. The vaselin preserves the integrity of the blood vessels, as has been shown in both laboratory and clinical experience.

In the severe cases it is always necessary to line the raw surfaces with skin. He himself had always used the Thiersch graft. Syphilitic subjects do not tolerate prosthetic appliances very well, and for this reason he places the grafts on perforate Cellosilk and holds them in position, either with his gold wire splints or with vaselin gauze.

A discussion the relative values of bone and cartilage as transplants is of no importance, as both are indispensable in this work Dr. Carter has always used both, sometimes singly and often in combination, depending upon the nature of the deformity and the quality of the resistance to be overcome in making the correction. If there is a question of choice between the two tissues, Dr. Carter prefers bone.

Dr. Carter said that the first time he ever corrected a deformity due to syphilis by transplanting bone, was in the spring of 1910; the case was reported and the patient presented before the Laryngological Section of the New York Academy of Medicine on Dec. 28, 1910, and as far as he knew it was the first case of the kind on record, though he himself had transplanted bone for traumatic deformities long before this. Dr. Carter kept in touch with this first syphilitic case for eight years; the man was a wanderer, and would be in San Francisco one month, and the next somewhere in South America, but he would write and report upon the condition of his nose; the correction was entirely satisfactory. and remained so.

In reply to Dr. Lore's question I feel that this has been admirably answered by Dr. Imperatori.

In reply to Dr. Carter's question relative to tension produced in tubing flaps, may I again state that to produce tension in a tubed flap as a rule, would mean necrosis of the flap. If flaps are properly tubed no tension will result. The object of tubing a flap is to prevent induration and infecton in the flap, conserve the circulation and, finally, when the distal end of the tubed flap is brought up to the part to be covered, there is more assurance of it taking than if the flap was brought up untubed.

As for epithelization of the syphilitic nose, I find, from extensive experience with this sort of work, after giving every known method a fair trial, that the only way to produce successful epithelization in the nose is by the method I have described to you tonight.

Sarcoma of the Superior Maxilla. Dr. Duncan Macpherson.

(Published in full in this issue.)

DISCUSSION.

The point of special interest in the case was the fact that radium was used. The patient had been presented a year ago. and was operated opon two years ago by Dr. Macpherson by partial resection. At the end of a year there was some sarcomatous tissue present and radium was applied. Dr. Macpherson said it is true that many of these cases do get well and did get well before radium was used. It has been said that one of our Presidents had sarcoma of the jaw. It was removed, and he lived for twenty years and finally died of something else. That was before the days of radium. This patient might have gotten well without radium had it been possible to remove all the diseased tissue by cutting. Radium has apparently done the work after the cutting operation, the tissue looking clean and normal at the present time.

Dr. Robinson said that since May, 1922, the patient had had altogether about ten treatments, from 1000 to 1200 mg. hours externally, inserting needles into the growth itself for from 3 to 5 hours, in all about 12,000 mg. hours.

Primary Carcinoma of the Trachea.

(Published in full in this issue.)

DISCUSSION.

Dr. Forbes said he did know whether Dr. Imperatori had seen any cases of primary carcinoma of the trachea. About 47 cases have been reported up to the present, and this case would bring the number up to 48.

Dr. Imperatori said that Dr. McCullagh had reported a similar case last year before the American Laryngological Association.

Foreign Body in the Neck.

(Published in full in this issue.)

DISCUSSION.

This case is of such interest as to justify me presenting it even before this honorable body. This little patient was struck by a motor car last summer and received a severe wound under the right lower jaw, with a fracture of the lower mandible. The neck became markedly swollen and the wound severely infected. Three weeks after the injury, she was removed to the Middletown Hospital and remained there some three weeks.

When she left hospital the wound had almost healed and her temperature was normal, but the neck still remained swollen. Between this period and the time she entered the Post-Graduate Hospital, Dec. 27, 1923, she was advised, and did receive, constant massaging for the resultant neck swelling. She was also treated by head movements. She was referred to me Dec. 27, 1923, for a dislocation of the trachea and for the repair of an ugly scar, which resulted from the injury.

Examination showed that there did not exist a dislocation of the trachea, that the swelling was caused by a foreign body, verified by Roent-

gen examination. On Jan. 4, 1924, Dr. John F. Erdmann observing, the foreign body was removed, which was thoroughly embedded in the carotid sheath. There existed a collapse of the jugular vein and a very marked erosion of the carotid artery, undoubtedly due to the massaging and head movements, which constantly drove the foreign body further inwards against the great vessels of the neck. The foreign body removed was a part of the door handle of the motor. It weighed about 3 ounces, 1¾ inches long and ½ inch wide. The patient left the hospital five days after the operation.

Dr. Harris congratulated Dr. Sheehan on the beautiful results shown, and said he had been present at the implantation operation and that Dr. Sheehan had certainly performed most ingenious, delicate and beautiful surgery in the dissection and implantation. One could only speak in the highest terms of the originality of the work, though he could not help being something of a doubting Thomas as to the eventual results. If, however, Whitridge's work in this line was as remarkable as in the ear, it was certainly very wonderful. One could only wait for time to show.

As to the patient suffering from any overflow of tears, anyone who had seen her, as he had, before the operation would certainly feel that she was infinitely better off than before.

The third case spoke for itself, and the patient certainly had reason to be grateful for the improvement.

Dr. J. D. Whitham told of a case somewhat similar to the one showed by Dr. Sheehan. The patient was a young soldier who had had X-ray treatment for a large port wine birthmark. As the result of this treatment given by a professor of Roentgenology in a medical college he had destruction of a large part of the soft tissues of the cheek including the bone. There was a large defect in front of the temporal region in front of the ear, with destruction of the bone and exposure of the dura, and an opening through the cheek into the antrum through which one could put three or four fingers. This condition was complicated by attacks of Jacksonian epilepsy. The defect in the cheek was corrected by a forehead pedicled flap which provided a new outer wall to the antrum. The temporal flap was corrected at a later date by a sliding flap of the scalp which included skin, remains of the temporal muscle and temporal fascia. This effectually restored both defects and there was no return of the convulsion.

Dr. Macpherson also congratulated Dr. Sheehan on the work he is doing and the cases shown, and said that whoever made the diagnosis in this case of the parotid discharging into the sinus was also to be congratulated. The person who thought of making the diagnosis of a discharging parotid gland into the nose was more or less of a genius. In retrospect, and having thought of its possibility, the diagnosis is easily made, but its occurrence is so rare that thought would not travel ordinarily in that direction.

Dr. Imperatori said that the diagnosis of the case of the woman with the parotid fistula was not a difficult one, once a possible clue was followed out.

She had been sent in from another service in the New York Post-Graduate Hospital and came to the Clinic complaining of a profuse discharge from her nose. The discharge was watery in character and there was no excoriation of the tissues. It was unilateral. The first thought was rhinorrhea, and various tests were made.

The fact that the fluid increased on eating gave us the first clue as to the possibility of its being parotid, in character.

The fluid was tested for starch digestion and was markedly positive. The case illustrates that in all cases of rhinorrhea it would be well to test for ptyalin and especially so if any mouth or antral operation has been done at some time previously. Had this been done, six weeks time would have been saved in this instance. The case also brings out the possibility of liability. For one not recalling the anatomy of the parts in doing a Caldwell-Luc operation might go back too far on the alveolar

process and include the duct in the flap. A flap operation was done on this patient and for two weeks she was free from the discharge through the nose. However, contraction of the flap resulted in a recurrence of the condition. It was felt that the under surface of the flap should be covered with epithelium, before any contractions could take place. This has been successfully done by Dr. Sheehan. Regarding the first case, that of the woman with the emplanted duct in the antrum, should this operation prove a success, it would be a wonderful thing. Though one cannot have a valve and stop the flow at will, the patient should be told of the possibilities beforehand and thus choose between the dripping from the nose and the fetid scabs—both of which are equally unpleasant; but of course with the choice of the former.

Dr. Sheehan said he was familiar with the method of repair of defects around the antrum as advocated by Dr. Whitham in a paper which appeared some two years ago in the *Journal* of the American Medical Association. It was a very commendable paper and one which all could learn a great deal from.

I am also aware, Dr. Whitham, of the great work Dr. Wheeler is doing in plastic surgery around the eyelids. I am very familiar with his work, he is a great friend of mine, and many of my cases of plastic repair of the lids are done according to his method. The case I presented tonight to you, Mr. D., was one in which the Wheeler method could not be utilized as there was total loss of the upper and lower lids, with a horrible burn of the upper face and temple area, as you have seen.

The only possible way in which the boy could be properly repaired, and I am sure you will agree with me, was by the methods which I have explained to you this evening.

Dr. Lore, referring to the interpretation of the pathological reports, told of an interesting case of a colored woman who came to Dr. McCullagh's clinic, complaining of a loss of 25 pounds in weight. There was no syphilitic history; she had had no children, and no abortions. At the base of the tongue was a large mass of fungating tissue, etc., the epiglottis being apparently friable, and the mass extending into the epiglottis. By direct laryngoscopy a section was removed and sent to the laboratory, and Dr. Eggston reported it to be a case of Hodgkin's disease. At first there was some skepticism about it, for the first diagnosis had been lympho-sarcoma, but the slide showed hyperplasia and typical giant cells, suggestive of Hodgkin's disease. A Wassermann test was made, and reported to be four plus. She was put on anti-syphilitic treatment, and the mass is disappearing; it is not so friable, and does not bleed.

Dr. Eggston's report on this case was as follows: Specimen consists of a mass of soft tissue measuring 10x5x5 m.m. Sections show a surface of stratified epithelium. Submucosa consists of a very hyperplastic lymphoid tissue. In areas there are definite follicles but the greater part of tissue is diffuse lymph pulp. In the latter there are some eosinphiles and large monoculear giant cells.

Diagnosis: Lymphoid adenopathy; probably Hodgkin's disease.

Dr. Lore inquired why radium was not used in the nose prior to the operation in order to minimize the bleeding.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

CONTRIBUTIONS TO THE STUDY OF THE SPHENO-PALATINE GANGLION.*

DR. SIMON L. RUSKIN, New York.

The sphenopalatine ganglion is the second largest nerve center in the head, and the largest nerve center outside of the cranial cavity. As such, it assumes a position of greatest importance to the nose and throat specialist. It innervates and is intimately connected with practically every region treated by the oto-rhino-laryngologist. It's distribution is so extensive as to give symptoms directly and reflexly to practically every part of the body. It involves most of the cranial nerves, the cranial and visceral autonomic system and some of the spinal nerves, with remote effects produced through paths not yet traced.

The effects from the ganglion vary from neuralgias of the face to the production of myalgic nódules in the trapezius and sterno-mastoid muscles, simulating rheumatism, disturbances of hearing, itching in the external auditory canal, neuralgias of practically every region of the head, vasomotor nasal engorgement or rhinorrhea and systemic effects such as nausea and vomiting, reflex asthma and dysmenorrhea. In fact, when one considers the multiplicity of symptoms that can be relieved by treatment of the ganglion one is hardly willing to admit to oneself that the cases were not those of hysteria. Yet a careful control rules out hysteria in practically every case. As Sluder very recently pointed out, not only can we not explain the

*Reported from the Research Club of the New York Post-Graduate Service of Dr. C. J. Imperatori.

variety of symptoms, but even the mechanism whereby cocainization or the application of silver nitrate to the sphenopalatine ganglion district permanently relieves symptoms arising from disturbances of the ganglion.

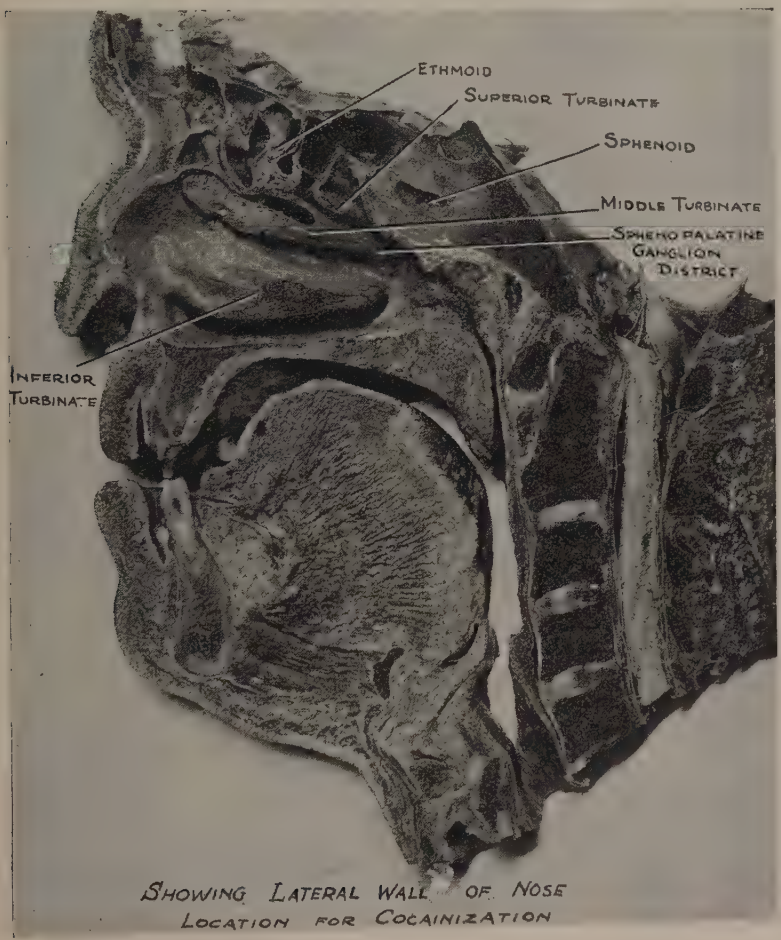
The ganglion has four main groups of branches; an internal or nasal group, a descending or palatine group, a posterior group and an anterior or orbital group. Each group must be studied to understand the effects of the ganglion. The internal or nasal group sends a number of branches, the largest of which is the nasopalatine nerve through the sphenopalatine foramen to pass medially across the lower part of the anterior wall of the sphenoid to the septum, thus supplying the major portion of the septum. From the same group also arise branches to the middle and superior turbinates, superior meatus, sphenoid sinus and posterior ethmoidal cells. The nasopalatine nerve, passing as it does, obliquely across the septum in a groove in the vomer and septal cartilage and through the anterior palatine foramen where the nerves of each side meet and form a small plexus, reaches the roof of the mouth, and supplies, in addition to the septum. the anterior portion of hard palate and incisor teeth.

The descending or palatine group of branches from the sphenopalatine ganglion comprise three large nerves, the anterior, middle and posterior palatine. These three branches associated with the posterior inferior nasal nerve descend almost vertically from the sphenomaxillary fossa into the pterygopalatine or posterior palatine canal. The posterior inferior nasal nerve leaves the canal through a small perforation to be distributed to the posterior two-thirds of the inferior turbinate and inferior and middle meatus. The nerve runs along the superior margin of the turbinate. The anterior palatine, which is the largest branch, emerges at the posterior palatine foramen to be distributed anteriorally over the roof of the mouth and medial side of the gums. The middle palatine nerve leaves the pterygopalatine canal to enter a small accessory palatine canal and emerge on the small pyramidal process of the palate bone to be distributed to the soft palate, uvula, upper two-thirds of the faucial tonsil and pillars. The posterior palatine nerve also leaves through a small accessory palatine canal and is distributed to the same area. In addition to sensory fibres, this nerve also contains motor fibres supplying the levator palati muscle.

The posterior group also sends several branches to the extreme superior part of the nasal cavity, nasal septum, sphenoid sinus and a pharyngeal branch to the nasopharynx, superior part of pharyngeal wall and medial part of Eustachian tube.

The anterior or orbital group consists of a number of small branches which leave the ganglion passing upward and anteriorly through the inferior orbital fissure supplying sensation to the periosteum lining the orbit, and some branches passing into the posterior ethmoidal cells.

SAGITTAL SECTION OF HEAD.

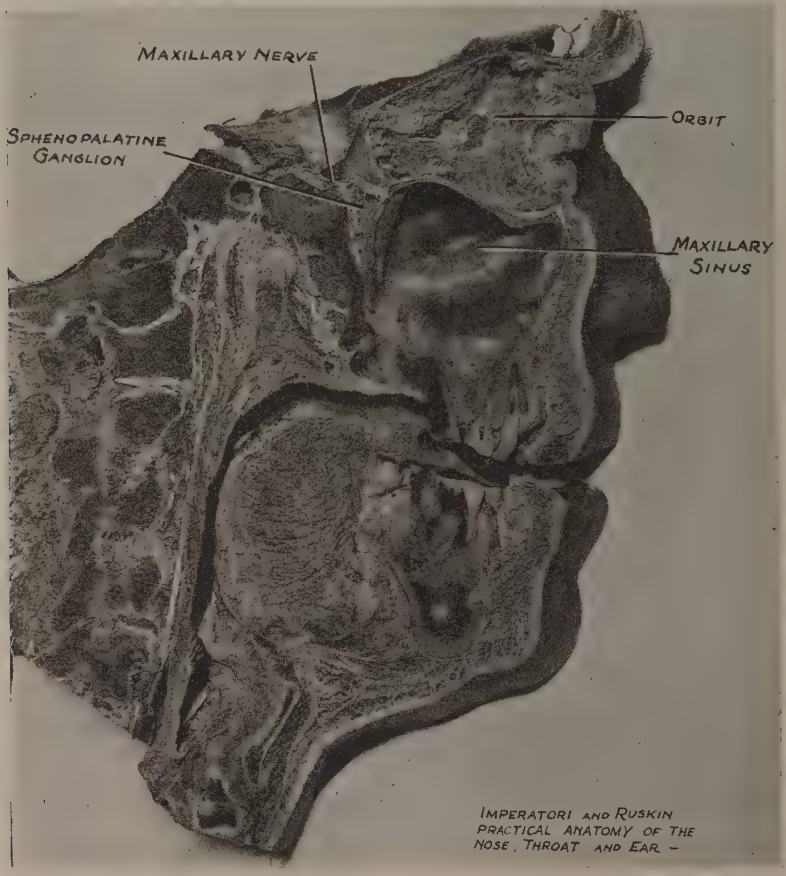


Arnold and Longet describe some branches passing upwards to be distributed to the neurilemma of the optic nerve. Bock and Valentine have observed a branch from the ganglion to the sixth nerve. Tiedman found a branch from the sphenopalatine to the ciliary ganglion. Luschka describes two or three branches, spheno-ethmoidal ascend-

ing to the superior portion of the internal orbital wall passing through the posterior ethmoidal foramen and entering the brain case.

The composition of the ganglion is likewise of very wide origin. The roots of the ganglion are sensory, motor and sympathetic. The sensory roots are the two sphenopalatine nerves passing medially from the maxillary division of the trigeminal to the ganglion. Many of

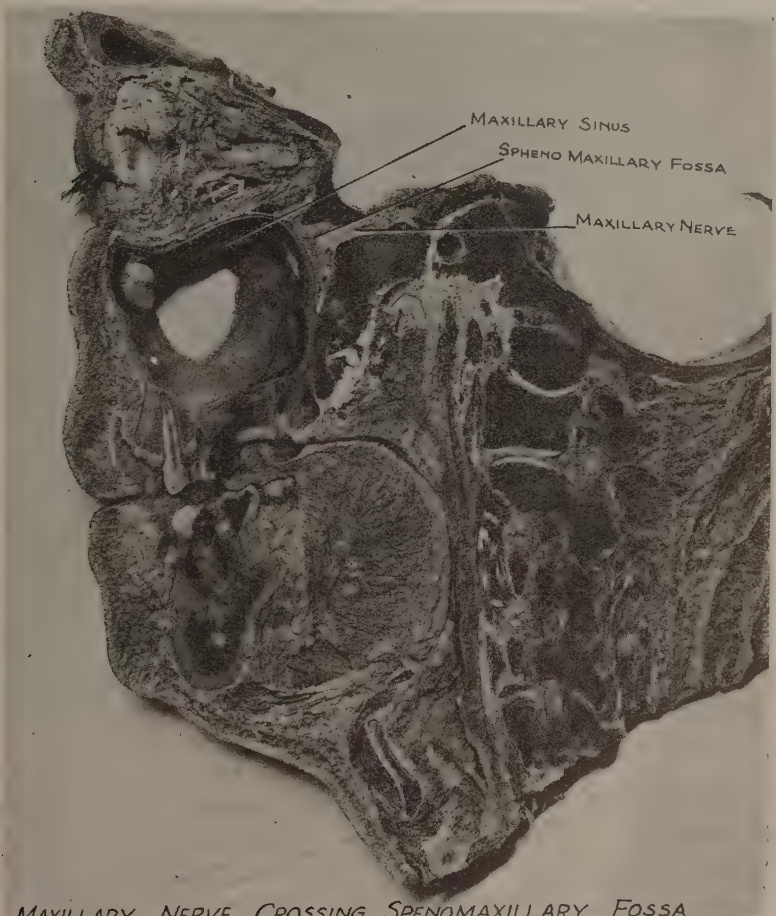
SAGITTAL SECTION OF HEAD.



these fibres are not involved with the grey matter of the ganglion and pass through it to be distributed to the palate and nose. Another sensory root is derived from the geniculate ganglion on the facial nerve. The geniculate ganglion is located on the upper portion of the medial wall of the tympanic cavity at the first knee of the facial nerve. Here the facial nerve bends sharply posteriorly to pass along

the medial wall of the tympanic cavity towards the antrum of the mastoid, while the greater superficial petrosal nerve runs anteriorly from the ganglion through the hiatus fallopii to emerge on the anterior surface of the petrous portion of the temporal bone. It receives a twig from the tympanic plexus and passes beneath the semilunar ganglion to the outer side of the internal carotid artery. Here it is

SAGITTAL SECTION OF HEAD.



MAXILLARY NERVE CROSSING SPENOMAXILLARY FOSSA

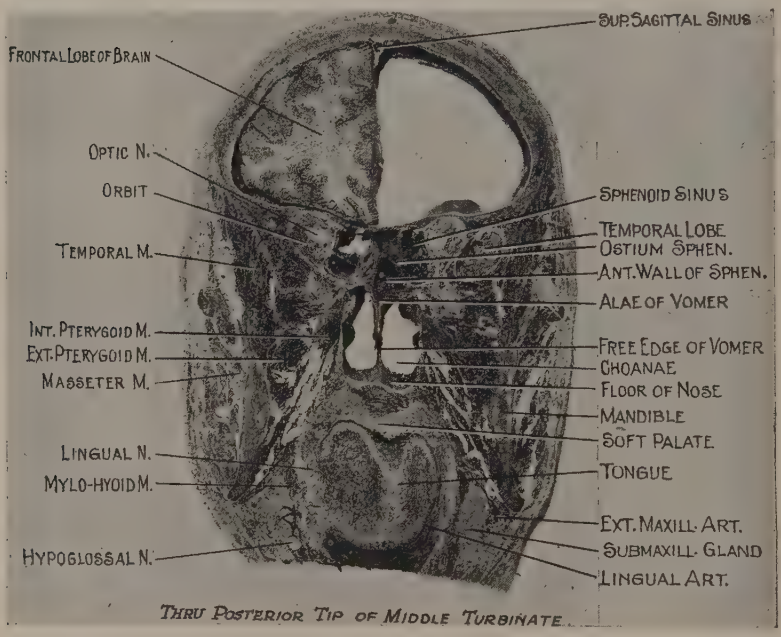
joined by the sympathetic root of the sphenopalatine ganglion, the great deep petrosal nerve, and the united trunk called the vidian nerve enters the pterygoid (Vidian) canal to join the posterior part of the sphenopalatine ganglion. The ganglion may also receive fibres from the glosso-pharyngeal nerve conveyed to it through the small

and deep petrosal nerves. The connection is sometimes described as the third sensory root.

The great deep petrosal forms the connection between the superior cervical sympathetic and the sphenopalatine ganglion. Many of its fibres end in the arborizations around the stellate nasal ganglion cells, from which in turn axones pass to blood vessels and glands by way of the ganglionic branches of distribution.

A close study of the facial nerve from which the greater superficial petrosal arises aids in understanding the wide distribution of

FRONTAL SECTION OF HEAD.



symptoms from the ganglion. The facial nerve consists of a motor and a sensory part, the latter being frequently described under the name of the Nervus Intermedium (Pars Intermedii of Wrisberg). The motor part supplies somatic fibres to the muscles of the face, scalp and auricle, the buccinator and platysma, the stapedius, the stylohyoideus and posterior belly of the diagastricus; it also contains some sympathetic motor fibres which constitute the vasodilator nerves of the submaxillary and sublingual glands and are conveyed through the chorda tympani nerve. The sensory root of the facial nerve with which we are most concerned arises from the geniculate ganglion

situated on the facial knee at the upper medial wall of the tympanic cavity. The cells of this ganglion are unipolar and the single process divides in a T-shape manner into central and peripheral branches. The central branches leave the trunk of the facial nerve in the internal acoustic meatus and form the sensory root; the peripheral branches are continued into the chorda tympanii and greater superficial petrosal nerves. The fibres of the sensory root pass into the substance of the medulla oblongata and end in the upper part of the terminal nucleus of the glosso-pharyngeal nerve and in the fasciculus solitarius. According to Arnold a twig runs back from the ganglion to the acoustic nerve.

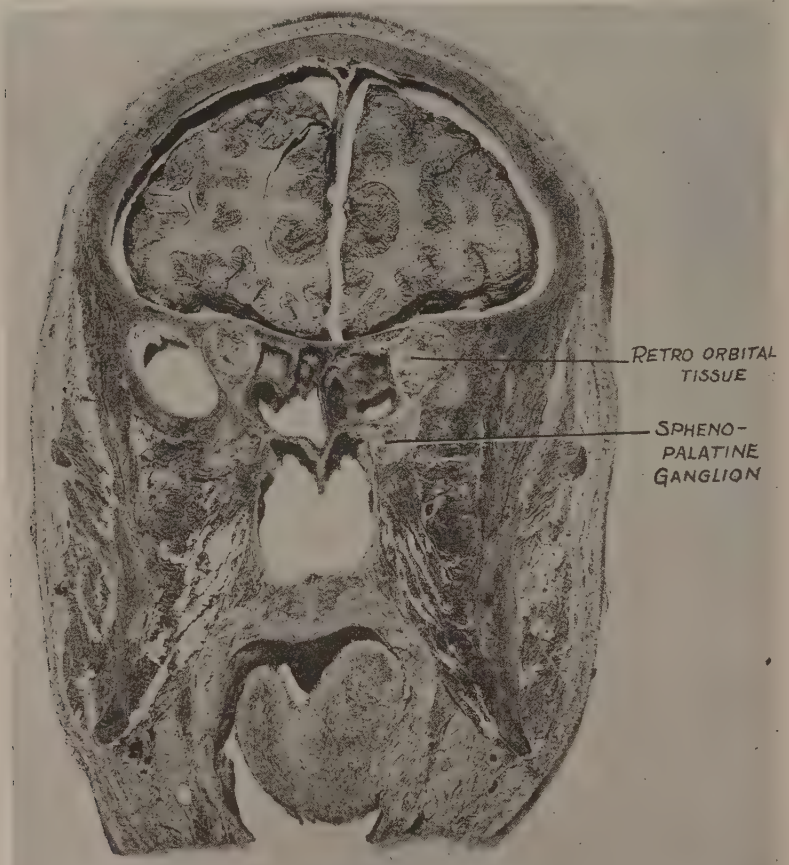
The branches of communication of the facial nerve may be arranged as follows:

In the internal acoustic meatus	With the acoustic nerve
At the geniculate ganglion	With the sphenopalatine ganglion by the greater superficial petrosal. With the otic ganglion by a branch which joins the lesser superficial petrosal nerve. With the sympathetic on the middle meningeal artery.
In the facial canal	With the auricular branch of the vagus.
At its exit from the stylomastoid foramen	With the glossopharyngeal With the vagus With the great auricular With the auriculo temporal
Behind the ear	With the lesser occipital
On the face	With the trigeminal
In the neck	With the cutaneous cervical

In the light of such wide connections one begins to see how an irritation of the greater superficial petrosal root of the sphenopalatine ganglion can produce disturbances ranging from neuralgia of the face to that of the neck. The connections with the cilary and otic ganglions can account for disturbances in the eye and mandibular regions. The connection with the tympanic plexus reveals the source of the reflex otalgia. The connections with the vagus could probably account for the relief of laryngeal pains. The relationship with the lesser occipital and cutaneous cervical probably account for the pain in the neck. The difficulty in the situation lies, however, in explaining the causes of a reflex passing to such distant branches. There is this to consider. Although a patient will appear with signs of mastoidalgia from a sphenopalatine ganglion disturbance from

post-ethmoidal disease, still on close examination one finds that the whole sensory root of the facial and its many ramifying branches are more or less involved; so we see, the case presents, in addition to the prominent mastoidalgia, pain deep in the orbit, one-sided headache, or sense of oppression, stuffiness in the ears or slight disturbances in hearing, pain in the occipital region, and pain in the muscles

FRONTAL SECTION OF HEAD.

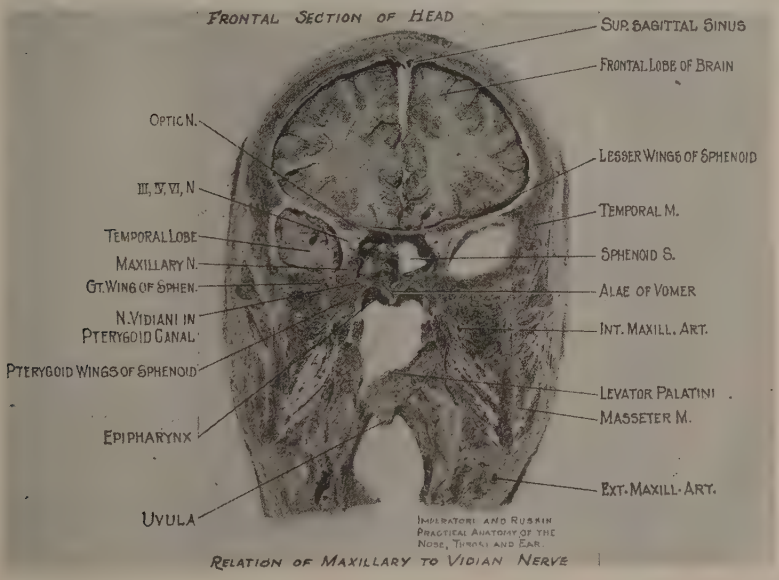


RELATION OF SPHENOPALATINE GANGLION TO THE RETRO, ORBITAL STRUCTURES.

of the neck and shoulder. occasionally also, nausea and palpitation. In one case there was in addition a severe tic doloreau involving almost all the muscles of the face. We must therefore consider the syndrome somewhat as a sensory facial nerve disturbance induced by the irritation of one of its branches, the greater superficial petrosal

at its ending in the sphenopalatine ganglion. The relief of the entire syndrome of so-called sphenopalatine ganglion neuralgia by cocainization of the ganglion is equivalent to anesthetizing the terminal branches of the greater superficial petrosal nerve, and thus excluding the irritations that ordinarily travel to the sensory part of the facial through that route. We thus see that sphenopalatine ganglion neuralgia is in some cases really sensory facial nerve neuralgia. In similar manner, we must consider a maxillary neuralgia and a neuralgia from the sympathetic root. Each of the three present distinct pictures, or a combination of two or three.

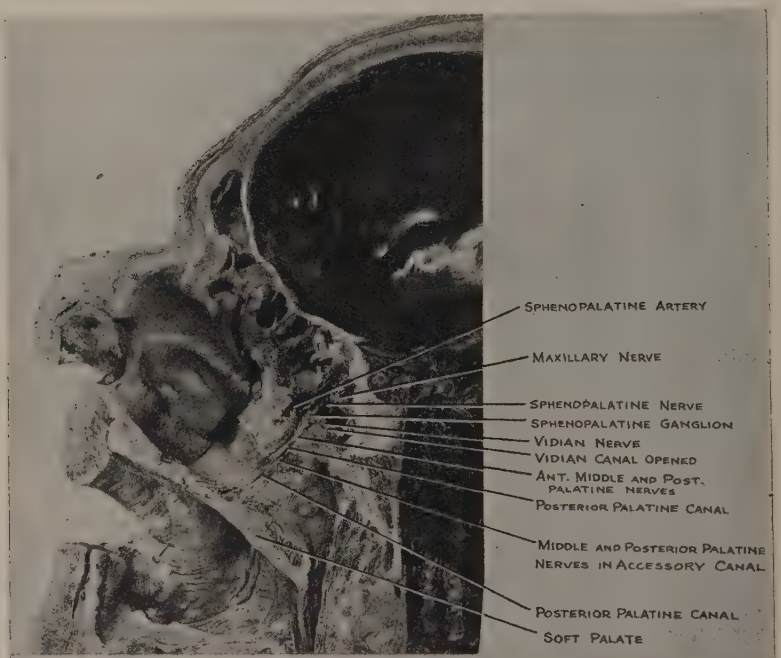
One must consider that here in the nose is exposed a large terminus for three great systems, the trigeminal, facial and sympathetic. No-



where in the body is there such a large nerve center exposed so superficially. In addition to its being superficial it lies in an area very frequently subjected to disease processes. Nowhere else does the sympathetic nervous system come within such close range for treatment. The deep petrosal nerve, coming as it does from the sympathetic plexus around the carotid communicates with the cervical sympathetic superior middle and inferior ganglia, and through the last with the first thoracic nerve supplying fibres to the heart and lungs. Hay-fever and asthma both manifest themselves by signs of sympathetic disturbances in the nose and chest. Likewise cardiac pains such as angina pectoris and gastric pains suggest themselves

as possible conditions amenable to treatment through the sympathetic connections in the sphenopalatine ganglion district. Dr. Imperatori has suggested cardiospasm as amenable through this route. How cocainization of the ganglion is able to permanently affect such distant branches is enigmatic, the fact however that it does remains to spur us on to more diligent research.

To summarize we must consider sphenopalatine ganglion disturbance not as an entity but rather as a combination of four different factors; a trigeminal maxillary syndrome, a sensory facial nerve



DISSECTION SHOWING SPHENOPALATINE GANGLION AND POSTERIOR PALATINE CANEL

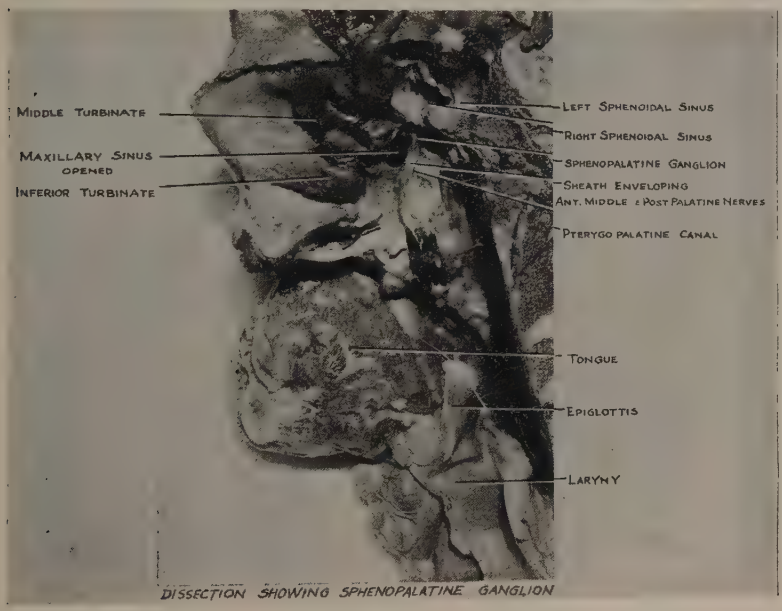
syndrome, a sympathetic syndrome and a local sphenopalatine ganglion syndrome coming from the cells located in the ganglion proper. Usually combinations of the above syndromes occur.

In considering the symptomatology of sphenoid, ethmoid and antrum disease one often enough finds all three, giving the same symptomatology, thus making unreliable a diagnosis based on symptoms. It is now obvious that all three will produce their symptoms through the same ganglion and thus give clinically the same picture.

For surgical purposes we can consider the ganglion as a sensory unit supplying to a large extent the sensation of the nose, the sinuses,

the roof of the mouth, tonsils and part of the pharynx. Near it lies the maxillary nerve and both can be reached by the same injection. The two together supply the integument of the cheek, the fore part of the temple, the lower eyelid, the side of the nose and upper lips, the lining membrane of the nose, the mucous membrane of the upper part of the pharynx, of the antrum and the posterior ethmoidal cells; the soft palate, tonsil and uvula and the glandular and mucous structure of the roof of the mouth.

The surgical importance of this center has hitherto received very little emphasis. About one year ago, an article by Silverman, the dental surgeon, printed in the *A. M. A.* caused me to begin a study

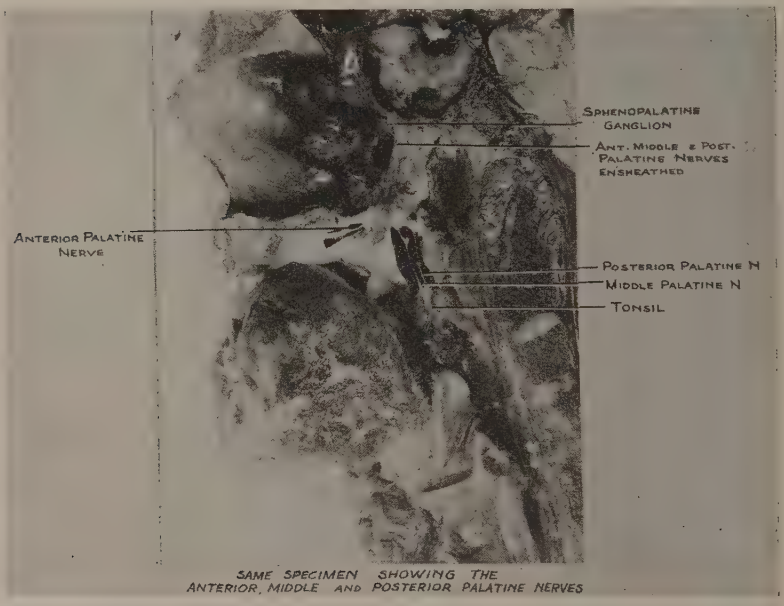


DISSECTION SHOWING SPHENOPALATINE GANGLION

of the sphenopalatine ganglion in connection with the research program of Dr. Imperatori's clinic at the New York Post-Graduate Hospital. Silverman described the injection of the maxillary nerve through the posterior palatine canal. It occurred to me that the sphenopalatine ganglion could be reached by the same route. Since that time I have used sphenopalatine ganglion anesthesia by this new route for a wide range of work and have found it very satisfactory. It has proven of great value in tonsillectomy where an injection of half a cubic centimeter of 1 per cent novocain into each ganglion supplemented by 1 c.c.m. at each base of the tonsil for the glossopharyngeal plexus has given total anesthesia. A very desirable effect

is the diminution of the after pains. The post-operative edema is less and the patient feels more comfortable than by the usual pillar infiltration. Although block anesthesia of the middle and posterior palatine nerves at their emergence from the accessory palatine canal has been practiced, nevertheless I have been unable to find reference to the use of the ganglion injection directly for anesthesia in tonsillectomy.

In radical antrum operations the ganglion injection and the maxillary nerve injection, both performed simultaneously by the new route has given complete anesthesia.



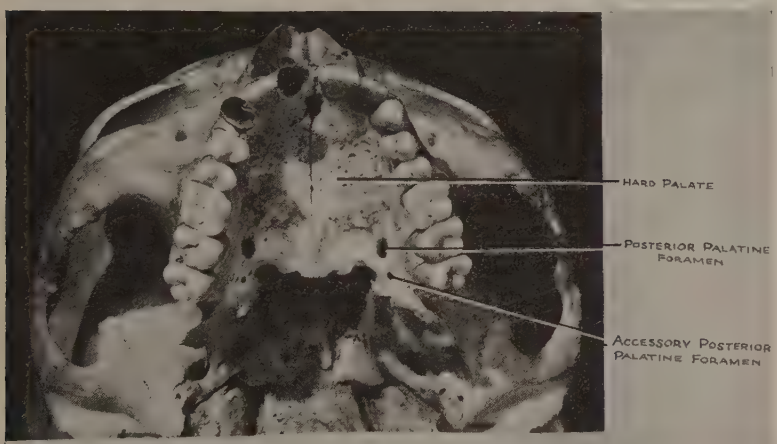
SAME SPECIMEN SHOWING THE ANTERIOR, MIDDLE AND POSTERIOR PALATINE NERVES

For radical ethmoid and sphenoid surgery the ganglion injection has given extensive anesthesia. One must of course remember that the anterior and posterior ethmoidal nerves are not affected by the ganglion injection.

For the submucous resection of the nasal septum the usual block anesthesia is more direct except in cases where the deflection is so great as to make the posterior part inaccessible. Here ganglion anesthesia is excellent.

The technique of the injection is very simple after the regional anatomy has been mastered. The sphenopalatine ganglion is usually described as situated in the sphenomaxillary fossa midway between the anterior border of the sphenoid bone and the posterior border of

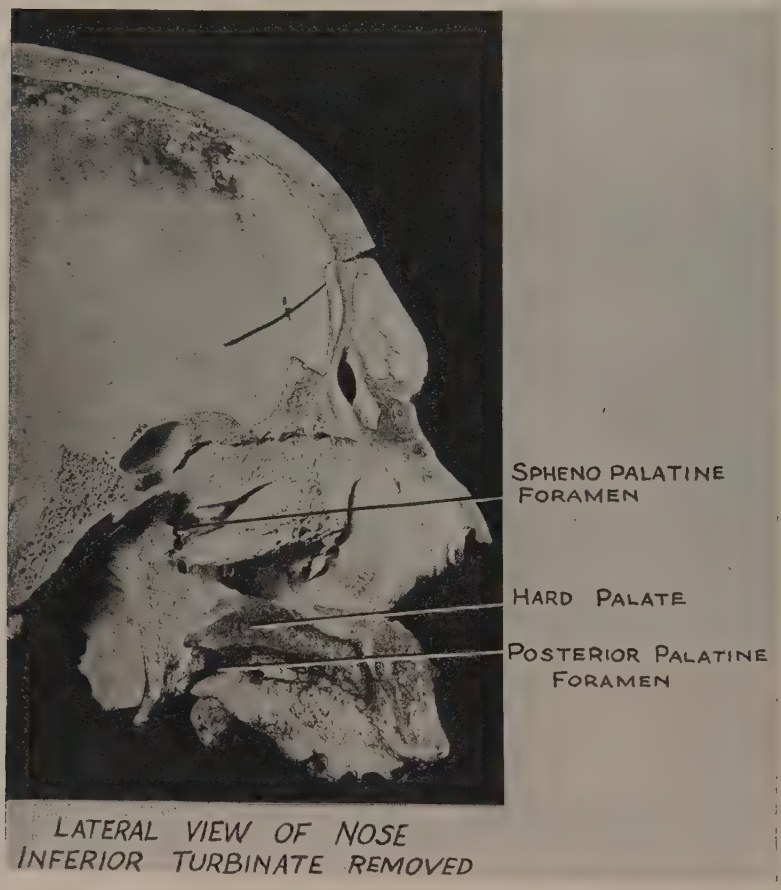
the maxillary bone and 5 to 6 m.m. beneath the second division of the fifth nerve as it bridges the ptergopalatine fossa. In dissections I have found the ganglion to lie rather close to the sphenoid, separated from the periosteum by a thin layer of fascia. The ganglion is hung a few millimeters below the maxillary nerve and appears to be slung between the maxillary nerve laterally and the Vidian nerve medially. Anterior to the ganglion is the fairly large sphenopalatine artery and a sheath of fascia surrounding it. The fascia surrounding the ganglion is quite distinct and can be seen extending down into the posterior palatine canal to about the level of the inferior turbinate. Laterally the fascia encircles the maxillary nerve, forming a sort of diaphragm around it. The fascia then extends up around the sphenoid fissure to envelope the retro orbital tissues. Thus



HARD PALATE SHOWING POSTERIOR PALATINE FORAMEN.

fluid injected into the ganglion region can diffuse up to the retro orbital structures, causing a temporary amblyopia or transient abducent paralysis. The ganglion lies in close proximity to the sphenopalatine foramen. Above, the ganglion is covered by the under surface of the sphenoid and orbital process of the palate bone, behind by the ptergoid process and greater wings of the sphenoid, anteriorly by the maxillary sinus, and laterally, and inferiorly by the sphenomaxillary fossa. As Sluder points out, we must consider the ganglion, not as surrounded by the various bones, but rather by the sphenoid, ethmoid and maxillary sinuses. The walls of these sinuses in relation to the ganglion are sometimes as thin as egg shell, and under these circumstances, the ganglion is exposed to the effects of diseased conditions of the paranasal sinuses. The anatomical varia-

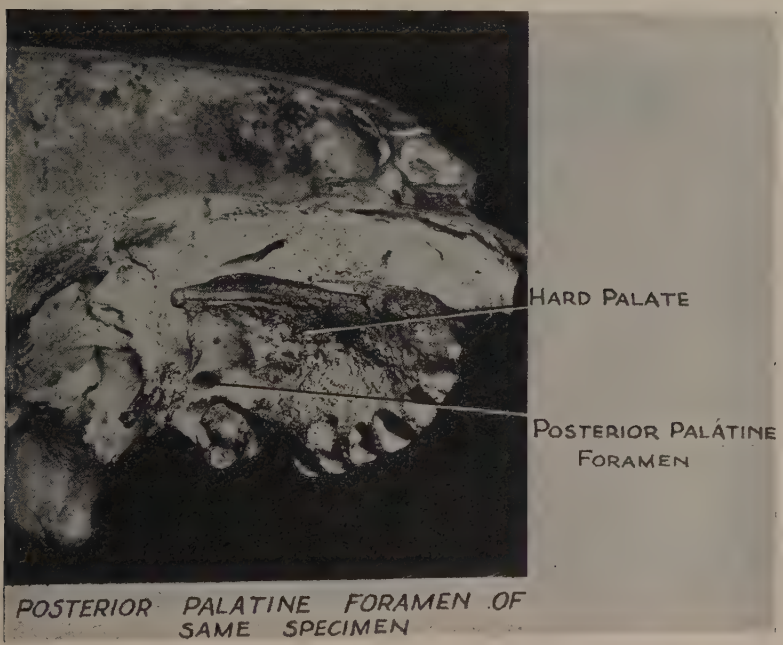
tions of the sinuses may also alter the above described relationship. The sphenoid sinus may thus bound the upper and posterior part of the ganglion, or an ethmoidal cell may extend down anteriorly. The nasal ganglion sometimes lies close in the opening of the Vidian canal. Anterior to the ganglion, imbedded in a mass of fat and connective tissue, lie the branches of the internal maxillary artery, the sphenopalatine artery proceeding medially to



the sphenopalatine foramen and then to the lateral wall of the nose, the palatine artery descending into the posterior palatine canal along with the palatine nerves.

Injection of the sphenopalatine ganglion can be practiced through three routes; laterally by way of the sphenomaxillary fossa, generally employed by the dentists; medially through the lateral wall of

the nose by way of the sphenopalatine foramen, as suggested by Sluder; and inferiorly through the roof of the mouth by way of the posterior palatine canal, as we suggest. The last route is the only one that is in constant relationship to the ganglion and is independent of any intranasal condition. In utilizing the posterior palatine canal one is guided as in a grooved director along the large palatine branch of the ganglion upwards directly to the ganglion in almost a vertical line. The technique of the ptergopalatine or posterior palatine injection as it is most conveniently called, is very simple. A glance at the illustration of the roof of the mouth shows the posterior palatine foramen. Through this foramen one enters directly the posterior

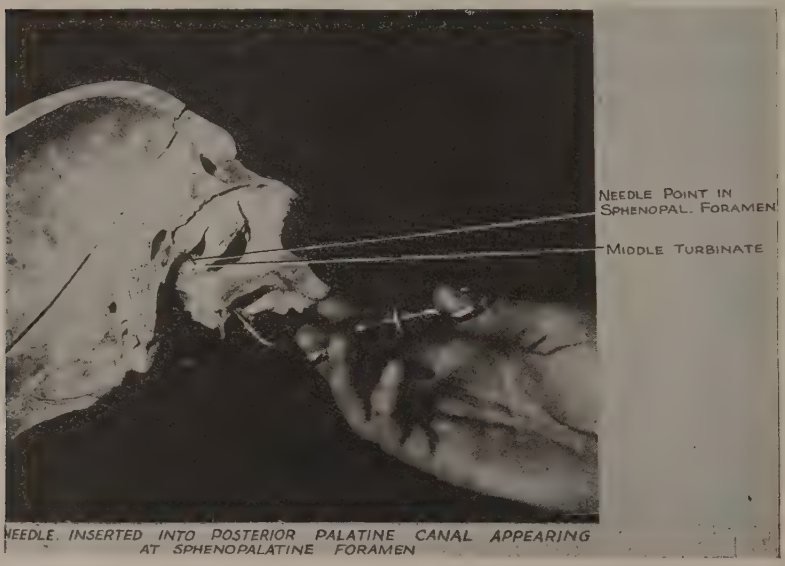


POSTERIOR PALATINE FORAMEN OF SAME SPECIMEN

palatine canal. The lateral aspect of the palatine bone shows a deep groove on its posterior portion, descending from the level of the sphenopalatine foramen. This deep groove is converted into the ptergopalatine canal by articulation with the maxillary bone. The illustration of the palatine bone shows the canal and the ptergopalatine fossa where the ganglion is located.

For the injection of the ganglion I employ a 22 gauge platinum needle, 45 m.m. long, mounted on a syringe at about a 45° angle. With the patient in the lying position and head extended, the canal, which is almost vertical in the sitting position, is brought into a

plane 45° to the horizontal. In this position I have found injection easiest, although it can also be done in the sitting position. To enter the canal one first locates the posterior palatine foramen. This opening is usually round, quite large and as seen from the illustration lies opposite the second molar tooth. Palpate the edge of the hard palate and insert the needle 5 m.m. anteriorly and about .75 c.m. medial to the second molar tooth. In edentulous mouths one is of course guided more by palpation of the hard palate. In these cases, however, the posterior palatine foramen is large, thus making it relatively easy. The posterior palatine foramen varies in its position. Sometimes it is opposite the last molar tooth or it may be oval in shape and quite close to the alveolar process. One is therefore obliged occasionally to probe with the needle to locate the opening.

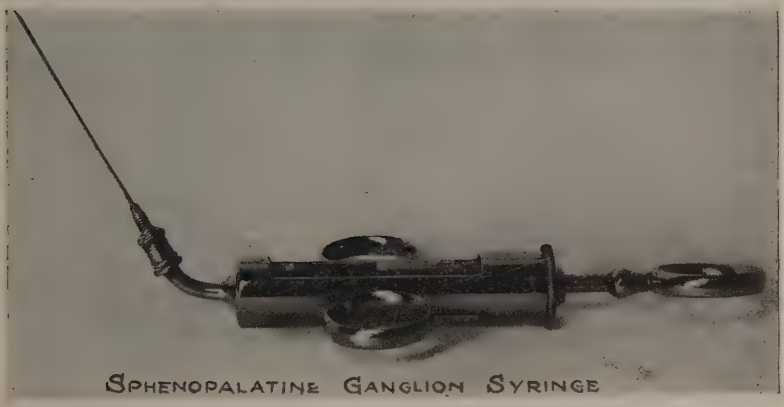


NEEDLE. INSERTED INTO POSTERIOR PALATINE CANAL APPEARING AT SPHENOPALATINE FORAMEN

Another guide to the foramen is an occasional dimple in the mucous membrane of the palate in this area. This dimple is sometimes redder or paler than the surrounding membrane. If one goes behind the posterior edge of the hard palate the needle slides in easily, but instead of being in the canal it has merely perforated through the soft palate and the fluid runs into the pharynx or appears mixed with blood in the nose. If the needle was placed through the soft palate more laterally it will slide along under the mucous membrane of the lateral wall of the nose and the fluid will be dopsited in the vicinity of the sphenopalatine foramen. In such event anesthesia of the ganglion would occur by infiltration.

The needle is inserted through the posterior palatine foramen into the posterior palatine canal to a depth of 3.5 to 4 c.ms. and will then, as shown in illustration, appear opposite the sphenopalatine foramen and directly in the ganglion. By advancing the needle 5 m.m. deeper the point comes to lie medial to the maxillary nerve, which can then be injected if necessary.

Preparatory to the injection, the patient's mouth is washed with alkalin antiseptic fluid and the roof of the mouth in the neighborhood of the site is painted with half strength solution of iodin. For anesthesia 1 per cent novocain with adrenalin is used. For alcoholic injection the posterior palatine canal is first located with novocain then followed with the alcohol. The patient should be warned against closing his mouth or a mouth gag can be used. Leverage on the needle must be avoided and at least .5 c.m. of the needle should remain outside of the palate to avoid any difficulties in extracting the needle should it break at the hilt. This accident is not more possible here than in injections elsewhere. Like all technical procedures, simple as it is, it nevertheless requires a certain amount of practice and skill.

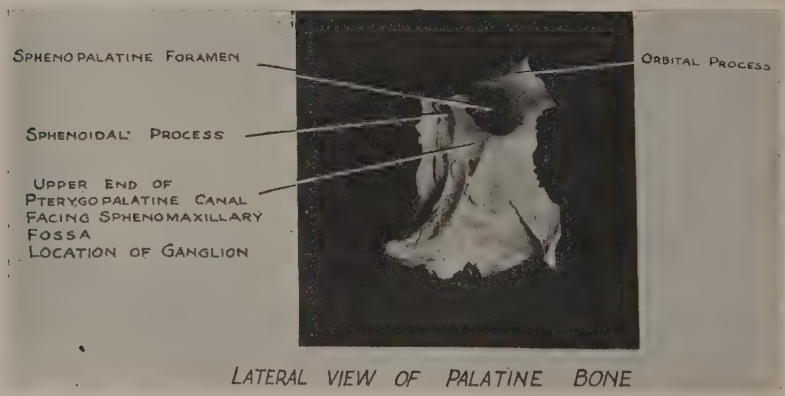


SPHENOPALATINE GANGLION SYRINGE

The medical aspects of the sphenopalatine ganglion have been splendidly worked up by Sluder. By injection one can easily and dramatically stop pain in remote regions that have not yielded to the effects of narcotics. It is almost unbelievable that the pain of a sciatica that has resisted almost every form of treatment should yield within a few minutes to a local application of cocain in the nose, yet such has been my experience. Dr. Hiram Byrd reports a series of 47 similar cases, including 5 cases of sciatica and several of arthritic pains. A list of the conditions that have proven amenable to

treatment through the ganglion are as follows. The first fifteen listed were recently review by Sluder.

External cricoidynia; lower jaw toothache; glossodynia; earache in case of Eustachian tube and middle ear lesions; earache secondary to cancer of the larynx; the pain of laryngeal tuberculosis; the pain of herpes of the shoulder; relief of spasm of the esophagus; relief of spasm of the face and upper respiratory tract; all syphilitic headache; malarial headache; ophthalmic migraine; dysmenorrhea; lumbago; intercostal pain (neuralgia); gastric pain; nausea and diarrhea; myalgias of the neck muscles; sciatica; maxillary neuralgia; tic doloreaux; sensory facial neuralgia; pain in the upper teeth and sensation as though teeth were too long; feeling of foreign body in the throat; persistent itching in the external canal; herpes zoster oticus; taste disturbances.



LATERAL VIEW OF PALATINE BONE

Long as the list appears to be, there are no doubt more conditions that will prove themselves amenable to treatment through the ganglion. One almost feels as though in the nasal ganglion we have a pain center. On the other hand, the sphenopalatine ganglion marks practically the upper end of the sympathetic nervous system. Fibres in the sympathetic chain are known to extend fairly long distances through several ganglia. It is thus possible that the sphenopalatine ganglion exerts an influence for a considerable distance along the sympathetic chain.

The cases as previously suggested group themselves under four headings: 1, sphenopalatine maxillary neuralgia; 2, sphenopalatine facial neuralgia; 3, sphenopalatine sympathetic neuralgia; 4, sphenopalatine ganglion cell neuralgia. The following cases illustrate examples of each. The typical cases involving most of the ganglion symptoms are fairly common and need no special consideration. I am

therefore giving only one example. The other cases described represent unusual pictures found in sphenopalatine ganglion disorders.

Miss L. D., age 28 years, teacher, referred to me by Dr. Julius Miller. At age of ten. following an attack of tonsillitis began getting headaches, which have continued intermittently to the present time, becoming progressively more severe. Her headache would begin in her left eye, spread to her left frontal region, then in the course of the day would go to the side of her head, mastoid and occipital regions, then into the neck and shoulder of the same side. The attacks would recurr about every two to four weeks and last about three to five days, during which time she would be practically incapacitated. Severe attacks would be associated with nausea and occasionally vomiting. Because of the cyclic character of the attacks she was given all sorts of glandular therapy and emmenogogues.

Examination during an attack revealed a ptosis of the left eyelid and slight dilatation of the pupil. There was a suggestion of flattening of the face on the left side. Nasal examination revealed a hypertrophied left middle turbinate and deflected septum. There was no post-nasal discharge. Throat and larynx negative. Cocainization of the sphenopalatine ganglion region stopped the entire attack in a few minutes. The headache disappeared, the ptosis of the left eyelid cleared, and the patient said that the eye felt much clearer. After several treatments the attacks became milder and less frequent. At present she is still subject to slight temporal headache occurring once about every four or five months and lasting only several hours.

This case is typical of the sphenopalatine ganglion 7th nerve type and shows its distribution in the area of the facial nerve branches. In addition there is apparent involvement of the 3rd nerve through the ciliary ganglion or sympathetic stimulation to the dilators of the pupils.

The maxillary type is illustrated by the following case: B. R., a young lady, referred to me by Dr. H. Handelman, who for the last two years has had pains in both maxillary regions and extending down into her mouth, particularly her upper gums. She also suffered from frequent attacks of frontal headache and pain deep in the eye. She has had rhinorrhea as far back as she could remember. After considerable treatment by various practitioners she finally decided to take matters into her own hands, so in spite of negative X-ray reports of the teeth and sinuses, insisted that her dentist remove two of her upper teeth. She got no relief and her condition grew gradually worse. Dr. Handelman diagnosed the condition and referred the patient to me for treatment. The application of 20 per cent cocain

to the ganglion immediately relieved her of the entire pain and following several treatments it cleared up entirely.

The sympathetic syndrome is well illustrated by the case of Mrs. S. W., age 59 years. For the last two years the patient has had a profuse watery discharge, so profuse that during the day she would continously wet handkerchiefs. At night she was obliged to wake up every few minutes to get rid of the secretion flowing down her throat. Associated with this was the complaint of fullness in the ears, tinnitis, pain in the muscles of the neck and shoulders, with the formation of painful nodes in the neck muscles. These nodes would appear most frequently as large lumps in the supra-clavicular regions, were painful and disappeared in a few hours. The patient also suffered from severe attacks of asthma, palpitation and nausea.

Nasal examination revealed a deflected septum, stenosis of the right middle meatus and bilateral ethmoiditis.

The entire syndrome was partially relieved by the application of 10 per cent silver nitrate to the ganglions. Following this I injected both ganglia by the new route. In five minutes she got a very severe attack of asthma and complained of severe headache, pains in both cheeks and the root of the nose. That night there was only slight discharge from the nose and in the morning the patient complained rather of dryness in the nose and throat. For two weeks she was in excellent condition, nose and throat practically normal. She then relapsed but did not suffer as badly as she did before injection. This case will no doubt need repeated injections.

Tic doloreux in one of our cases yielded remarkably to injection of the sphenopalatine ganglion and maxillary nerve through the posterior palatine canal route. This route has a distinct advantage over the nasal injection in that one can get a thorough injection of the maxillary nerve at the same time. Tic doloreux appears to be a combination of maxillary and sensory 7th nerve neuralgia with irritation of the motor facial fibres. At the sphenopalatine ganglion the greater superficial petrosal of the facial comes into relationship with the maxillary division of the trigeminal. I therefore assumed that this region was the likely source of the disturbance and proceeded to anesthetize the ganglion by local application in the nose. The relief, though incomplete, was instantaneous. I then injected the ganglion and maxillary nerves by the new route with 70 per cent alcohol and completely relieved the patient. The case was that of a woman age 64 years, referred to me by Dr. N. Gordon. She suffered for four months with severe spasms of Tic doloreux. The attacks would occur every few minutes and be induced by eating,

talking or the slightest exposure to cold. The patient was in severe agony in spite of the constant use of morphin. After two weeks' stay in a neurological institution a resection of the gasserian ganglion was suggested. She refused to permit operation and left the institution. It is now five months since the injection and she has had no recurrence whatsoever. This patient was demonstrated at the New York Clinical Society.

Another very interesting condition which ganglion treatment has been able to relieve is persistent itching of the external auditory canal. This occurred in a physician, one of my students at the New York Post-Graduate Hospital. The case is that of Dr. A. B. L., of Kingston, Ont. For the last six years he had suffered from severe attacks of itching in the ears, especially when using the stethoscope. The itching would be so severe as to awaken him sometimes at night and his scratching would lead to the frequent formation of furuncles. There were no typical headaches or neuralgias. Nasal examination revealed a chronic bilateral ethmoiditis with polypi in both middle meati. He had badly diseased tonsils. The treatment of both ganglia stopped the itching completely. He received two treatments and has had complete relief since.

Treatment of sphenopalatine ganglion has proven valuable in the relief of a feeling of the presence of a foreign body in the throat. This complaint is generally associated with signs of sensory disturbances elsewhere in the throat, such as a burning or stinging of one-half of the roof of the mouth or gums. The complaint is usually unilateral. These cases occur in persons around the age of 40 and 50. Usually they are diagnosed as hysteria or climacteric disturbance. The case of Mrs. H. age 40 years, is illustrative. She complained of a sensation of the presence of a foreign body in the throat and a scratchy feeling extending down into the chest along the sternum. She had an unproductive cough and some heaviness in breathing. During the summer she had frequent attacks of otalgia and cervical neuralgia. Examination revealed many carious teeth and diseased tonsils. The application of cocain to the ganglion immediately relieved her of the entire complaint. After several treatments she was considerably improved.

It appears that diseased tonsils, teeth, infected sinuses and mucous membrane lesions of the nose, throat and larynx have sensory connection with the sphenopalatine ganglion and give rise to their symptomatology through the various manifestations of the nasal ganglion.

Shortly after completing this article, a silk merchant, J. K., age 63 years, referred to me by Dr. N. Gordon, came to me complaining

of a bad taste in the mouth for the last twenty-one months. This bad taste, which at first was salty and now is rather bitter, is limited chiefly to the left side. This complaint is so severe as to cause the patient to awaken several times during the night to rinse his mouth. Occasionally he also has pains in the left maxillary region. He suffers also from attacks of dizziness and nausea. Examination revealed a bilateral ethmoiditis most marked on the left side. Cocainization of the sphenopalatine ganglion with 40 per cent solution gave immediate relief and after three treatments he felt considerably better. This type of case has rarely been diagnosed as of ganglion origin. My attention was called to this phenomena by one of the untoward results that followed a ganglion injection. The patient was injected for hay-fever associated with chronic ethmoiditis. For a few weeks after the injection she complained of loss of taste on the injected side. In tracing the possible cause I found that the sensory root of the facial, also called the Nervus Intermedius of Wrisberg, possesses taste fibres, some of which probably travel through the greater superficial petrosal to the sphenopalatine ganglion to be distributed through the palatine nerves to the roof of the mouth.

In conclusion, I wish to point out that we can consider the sphenopalatine ganglion neuralgia as a combination of four syndromes: *1*, sensory facial (7th nerve) syndrome; *2*, maxillary (5th nerve) syndrome; *3*, sympathetic syndrome; *4*, sphenopalatine ganglion cell syndrome.

These may occur singly or in combination. The sphenopalatine ganglion is one of the chief centers of nerve supply for the nose and sinuses and by anesthetizing it one can secure extensive anesthesia. The sphenopalatine ganglion can be readily approached for injection through the posterior palatine canal.

I wish to express my thanks to Dr. Imperatori for his hearty encouragement in this work.

351 West 86th Street.

OBSERVATIONS IN BONE-CONDUCTION AND A DIFERENTIAL TEST FOR STAPES FIXATION.*

Dr. Eugene Richards Lewis, Los Angeles, Cal.

In attempting to reach some conclusions concerning the testing of bone-conduction. I have been making use routinely of a number of observations. I am not at all sure that any of these procedures are new and my only purpose in applying them in a routine way in my clinical and private examinations was to make definite records for comparison, in the hope that something of value might result. So far the observations concerning lateralization testing have brought forth nothing worthy of report, but an interesting fact seems to have developed from the records of the monolateral bone-conduction testing. From my present findings in many hundreds of tests, I am inclined to believe that it is possible to differentiate between fixation of the stapes footplate and conduction-obstruction of other nature by the use of a very simple observation. It may be that this observation has been recorded before but I have found no mention of it.

The vibrating fork held on the root of the zygoma—just at the glenoid—is heard normally almost as loud and as long as it is when placed over the auditus-antrum area of the mastoid. When it is held on the tragus it is heard normally louder and longer than when it is on the zygoma-root. When the canal or tympanic cavity is the site of a simple obstructive lesion, the same relation continues to exist —namely, the fork is heard louder and longer on the tragus than on the zygoma-root. Cases of nerve-deafness also show this same relation between the hearing on the zygoma-root and the tragus—namely, the fork is heard louder and longer on the tragus than on the zygoma-root. When this test is made on cases of known fixation of the footplate of the stapes, this relation is reversed. The fork on the zygoma-root is heard long after it ceases to be heard on the tragus; while it *is* heard on the tragus, it is heard much louder on the zygoma-root.

This differentiation seems consistent with accepted conceptions of the physics of the hearing apparatus. With the fork on the bone, the vibrations are transmitted directly by bone in all directions; when the perilymph of the scala is encountered by the vibrations they are transmitted *normally* by the perilymph in such a manner as to effect interaction between the hairs of Corti and the tectorial membrane. With both round window and oval window closed, conceiving the membranous labyrinth as completely surrounded by unyielding tis-

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sue, transmission of vibrations in such a manner as to result in interaction of hairs and tectorial membrane would be theoretically impossible; but as long as either or both windows are not so closed, the contained fluid finds a venting which permits the production of the interaction necessary to stimulation of Corti's cells. In case of fixation of the stapes footplate, sound-waves conducted directly via the bone have no difficulty in stimulating Corti's cells, because of the venting at the round window; but sound-waves from the tragus produce almost no stimulation of Corti's cells, owing to the peculiar conditions encountered in the conduction mechanism of the tympanum. They might find access through the internal membrana tympani, but as the same membrane must act as the vent for the waves passing through it to the perilymph, its efficiency in acting thus as a transmitter is greatly lowered. This results in the marked inferiority of the tragus route as compared with the bone route for vibrations in these cases.

The test is very quickly carried out, using either a vibrating fork between 96 and 256 d.v. or the audiometer with bone-conduction sound-piece.

In carrying out the Weber test, I have been making use routinely of our points in the midline of the skull—the occiput, the vertex, the glabella and the jaw symphysis. While so far I have not encountered any striking developments with respect to lateralization, I have become convinced that the use of this four-point observation offers less probability of error in drawing deductions concerning lateralization than the use of any one point in the midline.

I have also been using routinely a simple procedure in conjunction with both the Weber and the Rinne tests which seems to me to be of distinct value. By obturating the external canals during these tests one can gain additional data concerning obstructions or lack of obstruction of the tympanic apparatus. A questionable lateralization of the Weber test may be converted to a pronounced lateralization by obturating the canal of the same side, or it may fail to be altered by such alteration. During the Rinne test, obturation of the canal may by obturating the canal of the opposite side, or this may fail to cause such alteration. During the Rinne test. obturation of the canal may convert a doubtful negative, or it may not change its doubtful character; on the other hand, it may reverse a positive. In any event, I have found the additional data derived from this procedure to be very welcome, and in many cases distinctly helpful in reaching a more ample diagnosis.

REPORT OF A CASE OF NASAL FIBROMA OF UNUSUAL EXTENT.

Dr. L. DeV. Chipman, St. John, N. B.

History: Four years ago patient noticed tearing of right eye. This was followed by difficult nasal breathing and later by complete nasal obstruction. He was seen by several specialists and intranasal operations performed, but no permanent relief obtained. The condition became progressively worse, mouth breathing also becoming obstructed, so that for the last two years he has not been able to breathe freely with his pharyngeal muscles relaxed, and for the last year, in

order to breathe, he has had to make a pronounced effort with his pharyngeal muscles to raise the mass in his throat, which apparently obstructs the larynx. Restful sleep has been impossible. About six months ago the nose became definitely enlarged and widened at the bridge.

Present condition: Patient is a boy, age 18 years. General appearance suggests one in the last stages of a malignant disease, with wasting and cachexia very pronounced. A red fibrous looking mass projects from the right nostril, and by pressure, entirely occludes both

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nostrils, also displacing the lateral walls of the nose. The pharynx is filled with a fibrous mass about the size of a child's fist, pendent from the posterior nares, and pushing the palate forward. When patient relaxes, the growth sinks down into the throat to about the level of the larynx, preventing breathing.

During sleep there is a period of relaxation followed by semi-strangulation, then a spasm of the pharyngeal muscles, a breath, and again relaxation, the picture being one of a drowning man fighting for breath.

Operation: Light ether anesthesia was induced, but as patient soon suffered from profound shock very little anesthesia was needed.

The pharyngeal mass was grasped with tenaculum forceps and pulled forcibly upward, the soft palate divided to the alveolar ridge

and the bony palate cut away. The mass thus exposed was found to be continuous from the nostril to the pharynx. It was very adherent to the roof of the nose throughout the ethmoid region. All the nasal structures were distorted and atrophic from pressure. Great difficulty was experienced in getting any line of separation, but finally with the alternate use of a Hurd tonsil dissector, and scalpel, combined with finger dissection, the entire mass was removed. The repair of the palate was easily made on account of the relaxation, and a perfect result obtained.

Except for shock symptoms the patient made an uneventful recovery, and when last heard from, one year after operation, he was in good health and had gained greatly in weight and strength.

42 Coburg Street.

LYMPHANGIOMA OF THE PHARYNX AND LARYNX.*

Dr. Arthur J. Huey, New York, N. Y.

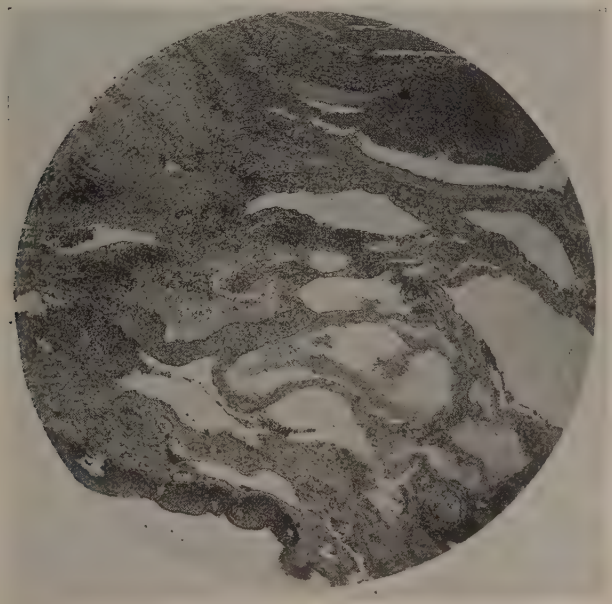
J. G., twenty-two years old; born in Cuba.

Family History: Negative.

Ven. History: Wassermann negative.

Past History: No previous diseases.

Present History: At the age of six years noticed a growth on the posterior wall of the pharynx. This slowly increased in size without much discomfort to the patient until October, 1923, when he began to have difficulty in swallowing, and obstruction to breathing.

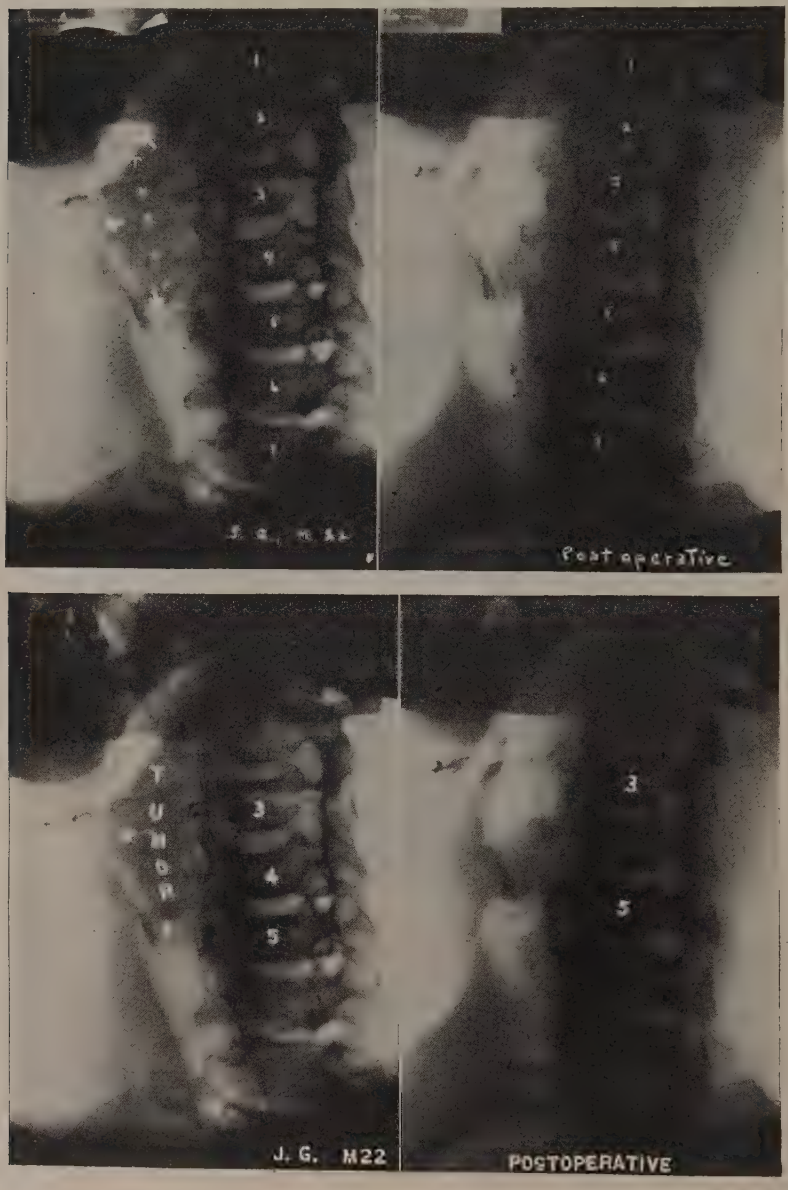


There was no pain. The loss of weight from October to January was considerable.

Examination: January 1, 1924. The patient was examined and showed a tumor on the posterior wall of the pharynx slightly to the right of the median line from the level of the edge of the soft palate downward into the larynx. The size was that of a hen's egg. The consistency was soft but not friable. The color was pale bluish gray. There was a small tumor of similar appearance the size of a grape situated slightly to the left of the larger growth.

*Read at the Section on Laryngology and Rhinology, New York Academy of Medicine, May 28, 1924.

Laryngeal examination was impossible. A radiograph showed the growth to extend to within an inch of the vocal cords. The lower end was somewhat pedunculated.



The patient was moderately emaciated. The expression was anxious, voice was thick but resonant. Blood count, Wassermann and urinalysis were all normal.

On January 8, I removed the smaller growth with a snare and sent it to the laboratory with a tentative report that the tissue was probably that of a mucous polyp. On January 15, an attempt was made to snare the larger growth. I was unsuccessful as it was impossible to get the wire over the whole tumor down to the base and the tumor itself was too resistant to cut with the snare. After breaking a loop of No. 9 wire repeatedly I was obliged to abandon the attempt.

That night the growth became red and swollen from the traumatism to such an extent that breathing was extremely difficult. A tracheotomy was done the following day to relieve the dyspnea and to allow an anesthetic to be given for the removal of the tumor. which was accomplished by direct laryngoscopy the mass being dissected away from its attachment with scissors and finger. There was very little hemorrhage. The tube was removed from the trachea the next day and the patient made a rapid recovery.

The specimen measured 7 c.m. in length by 3 c.m. in breadth, and weighed 35.3 grms. The pathological report was lymphangioma. There was considerable blood in the lymph spaces due to traumatism during the attempt at removal. Subsequent study of the small tumor first removed showed the tissue to be of the same character.

580 Park Avenue.

GIANT-CELL SARCOMA OF THE SUPERIOR MAXILLA.

Dr. J. A. Morgan, Honolulu, T. H.

The most common giant-cell sarcomata are those which grow from the alveolar process of the jaw and hang as pedunculated tumors in the oral cavity. The growths which are known by the name of epulis are covered for a time with the mucous membrane of the mouth, but tend to become ulcerated. They usually are small, but occasionally reach such size as to practically fill the mouth. When removed they show but little tendency to recur and there are no metastases.

Although large irregular protoplasmic masses with several large nuclei occur at times in many of the mixed cell sarcomata, there is a group of tumors in which typical multinucleated giant-cells form so

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constant a feature that they are classed by themselves under this name.

They arise usually in connection with bone and although many of them are other wise composed of spindle-shaped cells showing no tendency to cartilage or bone formation, there are also tumors containing such giant-cells which belong definitely to the group of osteosarcomata.

For this reason it has been suggested that the giant-cells may be identical with the osteoclasts of the bone which are endosteal or periosteal cells modified by their phagocytic function. Others have thought that since giant-cell sarcomata occur also in other places, such as the breast, far from any connection of bone, the giant cells

might be regarded as comparable to the ordinary foreign body giant-cells.

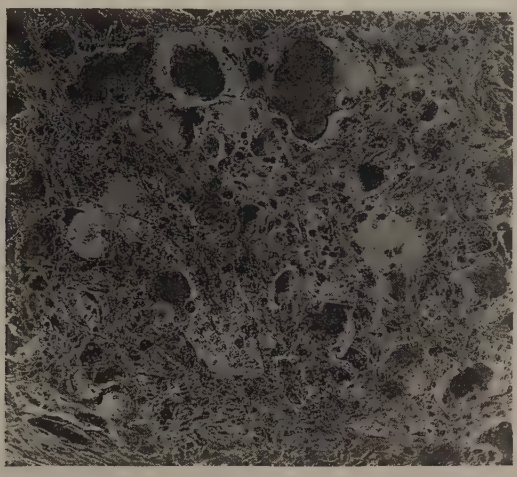
There are perhaps two fundamental differences between the giant-cell character of the osteoclasts and that of foreign body giant-cells, in both cases it seems to be a morphological modification dependent upon the function of the cells and perhaps only temporary. It is, therefore difficult to decide upon the relation of the cells of the tumor to giant-cells and probably dangerous to assume that any of these types of giant-cells could transmit their giant-cell character to their offspring. (McCallum.)

Mrs. T. B., Portuguese, age 19 years. Had the usual diseases of childhood. General health good.

At about the sixth month of pregnancy, patient noticed that there was a swelling on the upper jaw just under the upper lip. From

that time on to the completion of pregnancy the swelling continued to grow. After this had continued about four months the right canine and incisor teeth became painful and quite loose.

At operation the tumor mass about the size of pigeon's egg was found to be occupying the canine fossa and extending upward into



the floor of the maxillary sinus. At the lower pole of the tumor the canine and second incisor teeth were undermined and practically displaced from their sockets, therefore they were removed. The tumor mass was firmly adherent to the periosteum of the alveolar process and also had extended upward into the floor of the antrum of High-

more. The mucosa of the sinus was ulcerated and considerable pus formation had taken place in the sinus cavity. The maxillary sinus was drained and an opening made into the inferior nasal meatus. The patient made an uneventful recovery from the operation.

The tumor was of firm consistency and macroscopically had the appearance of a fibroma with small cranberry-like areas scattered through it. Microscopic section showed one layer of muscle cells, beneath which there was a layer of fibrous tissue surrounding a solid mass of tumor tissue. The tumor tissue showed a loose structure infiltrated with red blood cells and scattered evenly throughout there was a large number of giant-cells. The frame-work of the tumor mass is made up of loosely growing fibroblasts.

Although the laboratory diagnosis was giant-cell sarcoma it was thought advisable to give X-ray treatment. Once in three weeks an eight minute application of X-ray, 9 in. S. P. G. 13 M. A. 4 M. M. filter, 10 in. distance, was given to the former site of the tumor with no local reaction. After a period of six months there has been no sign of recurrence.

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Room 48, Young Bldg.

OBSTRUCTION OF A MAIN BRONCHUS WITH REPORT OF AN UNUSUAL CASE.

Dr. Chester Bowers, Los Angeles.

The causes of obstruction of a main bronchus are variable, and it seems worth while to assemble the different etiologic factors in determining the diagnosis of a rather unusual case. Before proceeding with the causes it might be well to review the anatomy and particularly the structures in relation to the bronchi.

The trachea bifurcates at the level of the upper margin of the fifth dorsal vertebra; on the chest it is marked by the junction between the manubrium and the body of the sternum. The right bronchus is one inch long, is larger in diameter, shorter and more vertical. Structures in relation to it, are—the vena azygos major arching over it from behind on its way to the superior vena cava and the right branch of the pulmonary artery lies below and in front of it. It can hardly happen that either of these vessels give rise to obstruction of the right bronchus. The left bronchus is two inches in length and is smaller in diameter and more horizontal in direction than the right. It is in relation with a number of important structures, that may cause obstruction of its lumen if they are themselves diseased. The important ones are—the arch of the aorta which starts in front of the left bronchus, crosses over it obliquely and passes down behind it as the descending aorta. The esophagus and thoracic duct lie behind the left bronchus. The left branch of the pulmonary artery lies at first above and then in front of it, and the left auricle and auricular appendix lie below it, within the pericardium. It is clear that the left bronchus is subject to compression and obstruction by the growth of such things as aneurysm of the arch, cancer of the esophagus or by the enlargement of the left auricular appendix.

Anomalies of the tracheo-bronchial tree are rare. Kahler reports two cases of diverticula of the tracheo-bronchial tree, consisting of rudimentary bronchial branches. Guisez reports a congenital valve-like web obstructing part of the trachea. Sankott reports a case of congenital narrowing of the trachea in which the membranous part of the rings were deficient and the rings were completely closed. The diameter in this case was narrowed to

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8 m.m. as contrasted with a normal of 20 to 27 m.m. Comparative anatomy shows closed rings are common to a majority of birds and some reptiles. Congenital Esophago-bronchial and Esophago-tracheal fistula have been reported.

The next matter to be considered is the variety of methods in which a main bronchus could be obstructed. These may be divided into the external causes producing compression, and the internal causes producing obstruction.

By far the most frequent of the external causes are aneurysm of the aorta, usually of the arch or descending aorta, rarely by the pressure of a much dilated left auricle in mitral disease. G. W. Pitt, in analyzing one hundred and forty cases of aneurysm of the aorta, found that thirty compressed the left bronchus, sixteen eroded into it, five compressed the right but none eroded into it. Jackson states that hypertrophy of the left auricle due to mitral stenosis is not infrequent.

Malignancy occurs as malignant disease of the esophagus which ultimately invades a bronchus and malignancy of the bronchial glands or mediastinum. Primary malignant disease of the main bronchi is far more frequent than is commonly supposed. Carl Weller, in 1913, reported a review of three hundred and seventy-four cases, and with analysis of eighty-nine cases which were verified by autopsy. Eighty-seven per cent of neoplasms of the lung and bronchi are of bronchial origin. They are most frequent between the ages of fifty-five and sixty, although two cases have been reported at seventeen and eighteen years respectively. The growth originates usually in the main bronchus just below the bifurcation. Carcinoma of the bronchi may spring from the bronchial mucosa or from the epithelium of the bronchial mucous glands. Endochondromata springing from the cartilage of the bronchi and sarcoma are of occasional occurrence. Recently Imperatori reported a case of primary Adeno-carcinoma of the bronchus. The growth was identified through the bronchoscope and verified by section. Freudenthal reports the repeated removal of a teratomatous growth in the trachea which recurred several times and finally resulted in the death of the individual. Septic pneumonia, abscess and gangrene are the usual sequellae of malignant disease of the lung.

Compression of a bronchus by a mass of enlarged glands at the bifurcation of the trachea is a factor to be considered in young infants. These glands may break into the bronchus, causing dyspnea and purulent secretion.

The internal causes of bronchial obstruction are:

1. Broncholiths,
2. Congenital Webs,
3. Syphilitic ulceration with scarring,
4. Primary malignant disease of a bronchus,
5. Foreign bodies in the bronchus.

Broncholiths are extremely rare. Syphilis of the trachea and bronchi is usually seen as a localized gummatous infiltration of the mucosa, causing considerable swelling; the gumma may be absorbed and a cicatrix result, or it may break down and an ulcer form with the production of a scar. The disease is often situated at the lower end of the trachea and the bronchi are implicated in one-half of the cases. In an analysis of a hundred and twenty-eight cases of syphilis of the trachea, gummatous swellings appeared in twenty, ulceration in fifty-one, twelve of which perforated, cicatrization in sixty. The result of the cicatrix is a narrowing of the lumen and the star-shaped scar constricting the bronchioles.

Malignant disease of the bronchi has been previously considered so we will now pass on to the consideration of foreign bodies in the bronchus. Of all the factors, this group is by far the most common cause of bronchial obstruction. The inorganic foreign bodies cause very little reaction but because of their shape may act as a ball-valve trapping the air below them and eventually causing lung abscess. The organic foreign bodies, because of their shape and reaction produced, are the worst offenders in causing obstruction of a bronchus.

The symptomatology of an obstruction of a bronchus varies with the completeness of the obstruction. In the complete the lung distal to the obstruction may be reduced in size, due to diminished air or airless and solid from collapse, or the bronchi filled with retained secretion. First mucous, later purulent, followed by secondary inflammatory changes and septic pneumonia. Before the bronchus is completely occluded the lung is over distended, the heart displaced to the opposite side and the diaphragm pushed down. With inspiration, the chest expands, the air is sucked past the obstruction; with expiration the air has greater difficulty in escaping than it had on entering and the lung becomes over-distended, resulting in displacement of the heart and diaphragm. Later the bronchi become filled with secretion, air under pressure is absorbed and the lung becomes solid and airless. Cough, dyspnea, expectoration are common to all cases. In the differential diagnosis the X-ray is of inestimable value. Aneurysm is diagnosed by the X-ray and

physical signs. Malignant disease by the age, cachexia, X-ray, foul expectoration, by the bronchoscope and biopsy.

In syphilis the blood Wassermann plus the hard paroxysmal cough and stridor and bronchoscopic examination. In none of the cases of syphilis was the stenosis sufficient to displace the heart.

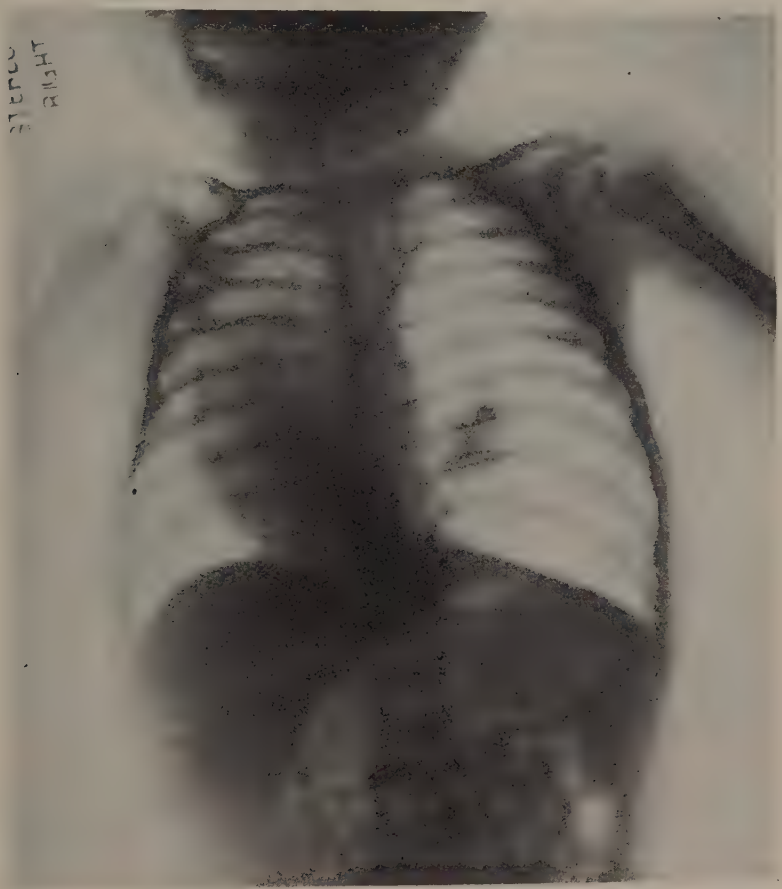
The physical signs of foreign bodies in the bronchi are variable and may even change from day to day. The more constant signs are decreased expansion on the affected side; the asthmatoid wheeze which is absent if the bronchus is completely occluded. Percussion shows impaired resonance, later dullness due to retained secretion. In the case of organic foreign bodies there occurs a reaction to which the term Arachitic Bronchitis has been applied, characterized by edematous and purulent tracheo-bronchitis, high fever, toxiemia and extreme dyspnea; absence of breath and voice if the bronchus is plugged. Willis F. Magnus has summarized the findings in the diagnosis of foreign bodies non-opaque to the X-ray by—

1. Greater transparency over the obstructed side.
2. Depression of the diaphragm on the affected side.
3. Displacement of the heart and mediastinal structures away from the affected side.
4. Limitation of diaphragmatic excursion on the obstructed side.

Case report: F. Y., age 7 months. Referred by Dr. A. J. Scott. Patient is the fourth child; normal spontaneous delivery; has always had rapid respiration, at time of delivery was cyanosed, for several minutes, obstetrician states that he had difficulty in getting the child to breathe and that there was a squeak of inspiration. The parents noted that the child had always breathed rapidly and this was especially marked after exertion. When the child was four months old the mother noticed a swelling on the right side of the sternum, this swelling increased in size up to the present time. Never sick before.

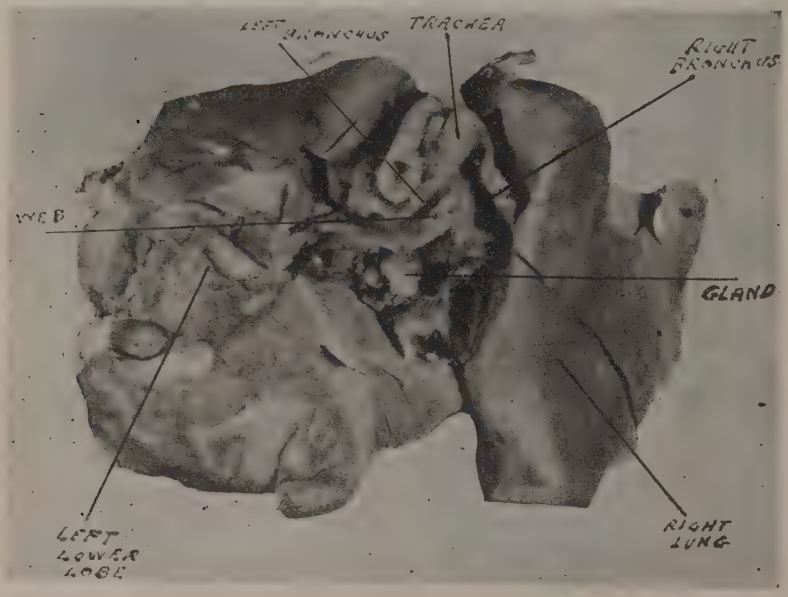
Present illness began six days previously with the symptoms of an ordinary cold with no temperature. Cold was better for three days but on the fourth day he developed a croupy cough, dyspnea but no cyanosis. Dr. Scott called and on examination found a bulging in the right costo chondral region from the fourth to the seventh rib. Color of the child was good except that when he cried, he became cyanotic. The heart was entirely to the right of the sternum; the left chest hyperresonant with distant breath sounds. The right, normal resonance; temperature was normal. Three days after the onset child had a choking spell, wheezed and became cyanosed. Was removed to the hospital. Physical findings were

the same as noted above, except the temperature was 100° rectal. X-ray of the chest—Dr. Henry Snure—shows a marked emphysema of the left side. The left diaphragm is flattened with practically no movement on the screen. Heart and trachea to the right of the median line. No enlargement of the thymus. Pictures two days later showed the same findings except that some secretion appeared in the left bronchus.



Blood count showed 7,000 leucocytes, 68 per cent polymorphonuclears, red count was normal. Two days later child became very much worse, more cyanosed, temperature 100.4° rectal, pulse 168, respiration 64. It was determined that a bronchoscopic examination should be made to determine the cause of the obstruction of the left bronchus. Bronchoscopy without anesthesia, 5 m.m. Jackson tube, thick purulent secretion was aspirated from the

trachea and right bronchus. Bifurcation of the trachea noted but no opening could be seen into the left bronchus, but a thick red membrane pouted into the trachea at this point. As the lesion was apparently a congenital one and the physical condition of the child so poor, the operation was stopped. The child improved after this operation, probably due to the aspiration of the secretion. Five days later was very much worse, had many choking attacks; was badly cyanosed; temperature 103° rectal, pulse 176, respiration 62. Physical findings were much the same except that rales were found on the right side. The left chest was hyperresonant anteriorly, some dullness posteriorly along the spine. Flouroscopy showed the heart still to the right of the sternum and the diaphragm practicallv



immobile. More secretion in the left lung. Blood count at this time was 27,350 leucocytes, 85 per cent polymorphonuclear.

Another bronchoscopy was done. The membrane at the opening of the left bronchus seemed less thick than previously, and by depressing the carina a small slit appeared superiorly. The bronchoscope was passed into the left bronchus. A large amount of secretion aspirated. No foreign body seen. As soon as the scope passed the web at the entrance of the left bronchus it was noted by the doctor holding the child that air passed into the left lung and that when the scope was taken out none passed in. The child was in such a critical condition that nothing more was attempted and thirty-six hours later the child died.

Autopsy report: There was a bulging on the right side of the third to the seventh rib inclusive at the costo chondral junction. Percussion note over the left chest was hyperresonant. On opening the thoracic cavity the left lower lobe filled the entire right side of the chest and ballooned over into the right side above. The right lung was small but not atelectatic. The upper lobe of the left lung is similar. The lower lobe is greatly enlarged. Cut surface showed some large white or yellowish areas which are firmer than the remaining tissues and filled with exudate. Subjacent to the bulging of the right costo chondral junction was the heart. The thymus was not enlarged and the heart and great vessels were pushed over to the right; the apex was against the right border of the sternum. The heart was freely movable. The pericardial attachment of the diaphragm was more to the right than the left and this maintained after the emphysematous left lung was removed. There were no enlarged glands around the great vessels. The heart and blood vessels appeared normal. On opening the trachea there was considerable purulent secretion encountered. In the left main bronchus, just below the bifurcation of the trachea, a gray opaque membrane was seen, which was attached to the anterior wall of the bronchus by a broad base. This membrane was somewhat tongue-shaped and was somewhat friable. The left bronchus below this contained much pus and there were multiple abscess scattered throughout the lobe. At the bifurcation of the trachea a lymphnode, 1 c.m. in diameter, was encountered. This did not seem to be pressing against the bronchus. No foreign body could be found. The right lung was small but no definite antemortem pathology seen except the bronchitis. No other anomalies or pathological conditions found. Smears of the abscess from the left lung shows a gram positive diplococcus. Microscopic examination by Dr. Roy Hammack,—section of the bronchus at the point of attachment of the membrane shows that this membrane consists of fibrin, leucocytes, and a few disintegrating blood cells. A few epithelial cells are entangled in it. At the point of attachment there was an absence of surface epithelium and marked leucocytic infiltration of superficial layers but none of the deeper layers of bronchial wall. Sections from the gray portions of the lung show large alveoli and dilated bronchi filled with pus cells. Section of lymphnode adjacent to bronchus showed mild inflammatory change. No evidence of tuberculosis.

Comment: The diagnosis was made of a congenital web at the beginning of the left bronchus for the following reasons:

1. Some congenital condition was present at birth as evidenced by the difficult respiration.

2. The cardiac displacement occurred three months before the present illness.

3. There was a definite membrane seen through the bronchoscope and found at post-mortem.

The microscopical section failed to show the connective tissue expected, but it seems reasonable that the intensity of the acute inflammation would mask the small amount of fibrous tissue in the original web. The possibility of the enlarged gland at the bifurcation of the trachea compressing the left bronchus with the subsequent formation of an exudate across the bronchus has to be considered. This can be ruled out by the fact that the gland was too small to compress the bronchus; that it was not tubercular but of an acute origin and secondary to the acute infection. The early absence of temperature and physical signs as well as the history makes the possibility of an organic foreign body unlikely.

In studying a large number of plates in the Bronchoscopic Clinic of Dr. Chevalier Jackson none showed the extreme cardiac displacement seen in this case nor in those cases was the heart constantly to the right of the sternum regardless of the respiratory cycle. The conclusion seems to follow that we were dealing with a congenital web in the left bronchus which partially occluded this orifice, that the child developed an acute respiratory infection causing a swelling of this membrane and that this acted as a valve trapping more and more air, producing a tremendous emphysema of the left lower lobe which displaced the heart and mediastinum to the right and terminated as a bronchial pneumonia.

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1136 West 6 Street.

SEVERE BURN OF MOUTH FROM THE ACCIDENTAL INGESTION OF GRANULATED LYE.

DR. PORTER P. VINSON, DR. HERMAN MOERSCH, Rochester, Minn.

The accidental or suicidal ingestion of a solution of lye is the most common cause of benign stricture of the esophagus. It is, however, quite unusual to observe more than superficial ulceration of the tissues of the mouth and pharynx following such an accident. The ingestion of granulated lye, on the other hand, may result in severe ulceration of the mouth without producing a burn of the esophageal mucous membrane. In the latter case the caustic is expectorated before any of it comes in contact with the mucous membrane of the esophagus, as is illustrated in the case reported here.

REPORT OF CASE.

A girl, aged four years, came to the Mayo Clinic, December 11, 1923, suffering from a severe burn of the lips, face, and inside of the mouth, that had followed the accidental ingestion of granulated lye three days before (Fig. 1). The child had mistaken the lye for sugar, and had taken it in a teaspoon. As soon as the caustic touched the mouth, it produced severe pain, and the mother thought that none of it was swallowed.

When the child was admitted to the hospital, there was deep ulceration of the lips and tissues of the buccal cavity, and because

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of the intense discomfort, she could not be persuaded to take food or fluid by mouth. Proctocylsis was started at once and within twenty-four hours, fluids were being taken orally. Convalescence has been uneventful except for the scarring of the mouth and lips that has resulted from the contracture following the healing of the ulcerated tissues (Figs. 2 and 3).

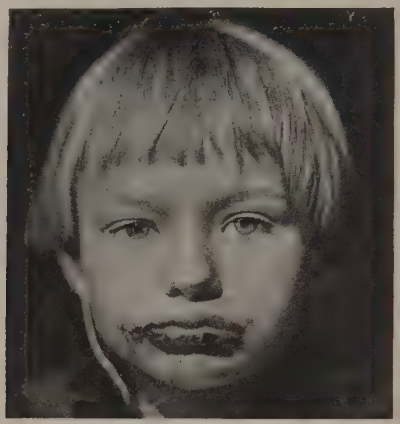

Fig. 1. Burn of the mouth one week after the ingestion of caustic. Patient has swallowed thread pending esophagal investigation.

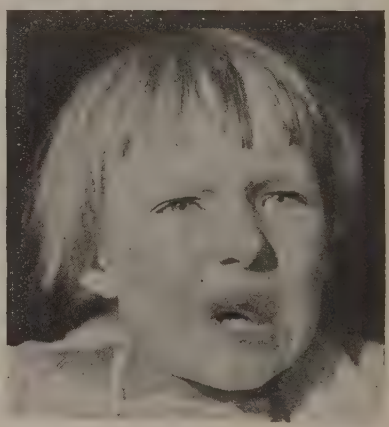

Fig. 2. Contracture of the lips one month after accident. Thread still in place.

Fig. 3. Contracture of the lips four months after accident. As the patient has been free from esophageal symptoms, the thread has been removed.

So far as has been determined, the esophagus is not affected, and the patient can swallow any type of food that can be taken into the mouth. It will probably be necessary to perform one or more plastic operations to overcome the facial deformity, but the ultimate result should be satisfactory.

FOREIGN BODIES OF DENTAL ORIGIN IN THE LUNGS: ANALYSIS OF ONE HUNDRED AND SEVENTEEN CASES.

Dr. Elbyrne G. Gill, Roanoke, Va.

In presenting this subject a careful and painstaking effort has been made to analyze the reports of all cases that have been published in this, as well as in foreign countries. No attempt to review cases through personal communication has been made. A few cases giving fragmentary reports of foreign bodies of dental origin have been reviewed but not included in this analysis as it is the purpose of this contribution to give an accurate and complete analysis of only those cases reported in detail up to the present time. There have undoubtedly been many more cases of this type, but not published

We are all familiar with the work of our contemporaries in this particular field. The most comprehensive report hitherto made is that by Hedblom. It is to his tabulation that I am indebted for clues to some of my references. Arrowsmith, Wood, Hoffman, Jackson and Forbes, as well as many others, have made contributions to this subject. A review of the older literature is of interest in that we find that as early as 1717 Verdon performed a "Bronchotomy" for a foreign body in the trachea. In 1854, years before the laryngoscope and bronchoscope were in use, Gross published an exhaustive work on the subject of "Foreign Bodies in the Air Passages". In 1860, Horace Green wrote a paper on "The Difficulty and Advantage, of Catheterism of the Air Passages in Diseases of the Chest", embodying the work of several years and reporting on 106 cases treated.

The present analysis includes foreign bodies of the following types: Teeth, dental burrs, gold crowns, dental plates, fillings, blade of forceps, plaster of paris, hard rubber from dental mouth gags, discs of Allen's dental cement and nerve canal reamers. The case previously reported by the writer will be included in this report.

The order of occurrence is as follows: Teeth 76, artificial teeth 6, dentures or dental plates 8, dental burrs or instruments 9, crowns (gold) 7, dental fillings 3, blade of forceps 1, plaster of paris 1, hard rubber from dental mouth gags 1, disc of Allen's dental cement 1, nerve canal reamers 1, gold three-tooth bridges 2, dental broaches 1, tarter from teeth 1.

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Location of foreign bodies: In this type as well as in other types of foreign bodies the right bronchus is the favorite site of lodgement, the ratio being 2 to 1 in the series, 56 being in the right and 28 in the left bronchus, 1 in the trachea. The exact location in each bronchus is given in the table. The location was not stated in 29 cases.

Nature of accident: The majority of accidents occurred while the patient was under anesthetic, gas anesthesia having been employed in 19 cases, ether in 20, chloroform in 3, rectal anesthesia, 1 case. In case reports stating that extraction had been done under general anesthesia, it was suposed that ether had been used and this probably accounts for the greatest number of accidents occurring under ether anesthesia. The remaining accidents occured in the following order:

Aspirated: time not stated, 4; during sleep, 2; while eating, 1; while coughing, 2; while in dental chair, 9; when kicked by a horse, 1; when making cast for mouth, 2; while in Petit-mal, 2; while in intoxicated stupor, 1.

The nature of accident was not stated in 50 cases. In all but one case some operation about the mouth was being performed when the accident occurred.

Symptoms and signs: The most constant and definite symptom is a cough, which varies from an occasional one to one that is persistent and accompanied by profuse expectoration. A case reported by Chambers is the only one which did not have cough as an early or late symptom. (Sojourn of foreign body, five days.)

In this series 64 cases developed a cough as an early or late symptom. Cough was the only symptom in 6 cases, dyspnea was present in 17, pneumonia (pneumonia is so often erroneously diagnosed by misinterpretation of the physical signs in foreign body cases that it may well be question whether true lobar pneumonia existed in these 2 cases) in 2, cyanosis in 2, pain in chest in 28, hemoptysis in 14, nausea in 1, elevation of temperature in 19, profuse expectoration in 40, consolidation of lungs in 5, night sweats in 4, and in one case reported by J. Isarel the secretion from the bronchi contained actinomycotic rosettes (sojourn of foreign body 1½ years). The symptoms were not stated in 31 cases. Thirty-two cases developed lung abscess. Of this number 17 recoverd, 13 died and the results were uncertain in 2 cases. No distinction has been made between the early and late symptoms, both being included under one classification.

Sojourn: The sojourn in the lungs of the foreign bodies presented in this series varied from four hours to thirteen years. In

the case of short duration, the foreign body was removed bronchoscopically by Forbes. This patient was in a dental chair having a gold crown fitted to the right upper canine tooth. The crown became loosened during a fit of coughing and disappeared. The suspicion of the dentist was aroused by the immediate development of coughing and an X-ray examination of the chest was ordered. The management of this case by the dentist is worthy of being followed by others of his profession.

In the case of thirteen years' duration, reported by W. C. Carpenter in 1842, four false teeth on silver clamps were aspirated during a fit of coughing. X-ray examination was not made and bronchoscopy not attempted. Patient died, post-mortem findings given under that classification.

Treatment: The expectant or symptomatic treatment was employed in 38 cases. Of this number 19 recovered and 16 died. The results were uncertain in 3 cases, peroral bronchoscopy was employed in 44 cases, being successful in 38, which completely recovered.

Lower bronchoscopy through tracheal wounds was successful in 6 cases. All of these recovered. Thoracotomy for drainage of lung abscess was necessary in 23 instances, with 13 recoveries, 6 deaths and uncertain results in 4 cases. Tracheotomy was performed 4 times, with 3 successes and 1 failure. Artificial pneumothorax was successfully employed in one instance. One of the 6 bronchoscopic failures was complicated by a lung abscess and later resulted in death. Another death followed a partial pneumonectomy, four previous attempts to remove the foreign body bronchoscopically having failed. This foreign body, a dental burr, had lodged in the upper outer lobe bronchus. This case report is obtained from Hedblom's tabulation and the writer has been unable to confirm it as the references are not available.

In the remaining four bronchoscopic failures, the patients recovered. The foreign bodies were probably coughed up.

Results: Of the 117 cases in the entire series, 84 recovered. The results were uncertain in 9 and there were 24 deaths. Fourteen patients died as the result of lung abscess, 1 following tracheotomy, 3 from symptoms simulating tuberculosis, 1 from bronchiectasis, 1 from pneumonectomy, and 3 cases the cause of death was not stated.

Of the 84 cases which recovered, the foreign body was removed bronchoscopically in 38 instances, it was coughed up in 37 instances, removed by lower bronchoscopy, through tracheal openings in 5 instances, by successful tracheotomy in 3 and 1 case was relieved by artificial pneumothorax.

POST-MORTEM FINDINGS.

H. Bayer: Tooth causing lung abscess.

W. C. Carpenter: Fistula of lung opened into large empyema cavity containing pus. Lung collapsed, denture with four teeth found in the pleural cavity. Left lung tubercular.

Robinson (Mayo Clinic): Bilateral bronchiectasis, left empyema, tooth in lower lobe of right lung.

R. J. Goodlee: Advanced bilateral tuberculosis, cavity of right apex, tuberculosis of the caecum bilateral lower lobe, bronchiectasis, tooth in lower right lobe of bronchus.

J. Israel: Cavitation in left lung, fragment of tooth in pleural cavity.

J. S. Warrack: Complete obstruction of left main bronchus. Whole lung gangrenous, crowned bicuspid, tooth wedged into bronchus; ball valve obstruction.

A. E. Wigg: Large, empty empyema, small abscess in middle lower lobe, bicuspid tightly impacted.

T. K. Monro: Entire lung gangrenous.

R. Morrison: Pericarditis; tooth stump impacted in bronchus; missed in resection by three-fourths inch.

Fowler: Tooth found impacted in a secondary bronchus.

A. Poulet: Right lung was adherent. Exudation marked piece of tooth in hilus of right bronchus.

J. Schulz: Advanced tuberculosis in both lungs, with large cavity in right bronchiectasis. Tooth found in bronchial bifurcation.

F. J. Tees: Small piece of tarter found in abscess in right lung, connecting with interlobe or abscess and so with pleural cavity.

C. Wall: Tooth plate found in right bronchus, secondary bronchiectasis of right lower lobe. Septic pneumonia in left lung.

Remarks: Foreign bodies of dental origin produce symptoms similar to those arising from other inorganic objects. The train of symptoms to be expected are cough, pain in chest, hemoptysis and dyspnea. These may be the only symptoms produced for years while on the other hand lung abscess may develop within a very short time. Warrick and Monro report cases of death on the tenth and on the sixteenth day following the aspiration of teeth. In each instance the entire lung was gangrenous.

This much can be said with certainty, "If a foreign body is aspirated into the bronchi and allowed to remain, abscess formation will likely follow, in the majority of cases."

In this series there were two cases of foreign bodies, of five years' sojourn in the lungs, which produce no symptoms other than cough

and hemoptysis. In one case reported by Lynch, plaster of paris had been aspirated, and in the other case reported by the writer, the foreign body was a dental plate. Both cases made complete recoveries after bronchoscopic removal.

When dental work has been done and any portion of the denture is missing after the operation, the dentist should satisfy himself that the tooth is not in the bronchi. The importance of this is readily realized by a study of this series of cases. When the object was coughed up or removed early there was no complication, but in the neglected cases abscess formation was the result.

A diagnosis can be made by the history in many cases. If not, an X-ray should be made and should this not be conclusive, bronchoscopy in skilled hands should be performed.

The indications for bronchoscopy for a foreign body as outlined by Jackson are as follows:

1 The appearance in the Roentgenogram of a foreign body or of any suspicious shadow.

2 Cases in which a clear history is given of the patient's having choked on a foreign body and in which the foreign body was not afterwards found.

3 Cases in which there are signs of stenosis of the trachea or the bronchus.

4 In any case suspected of bronchiectasis.

5 In the absence of any history of a foreign body, the patient giving symptoms of pulmonary tuberculosis, without the finding of bacilli in the sputum, and especially if the physical signs are at the right base, and, above all, if there are also physical signs of pleural effusion.

6 In case of doubt, bronchoscopy should be done.

Jackson recognizes no absolute contra-indications to bronchoscopy.

If the presence of a foreign body has once been definitely established there is only one treatment—bronchoscopy. In this connection mention should be, again, made of the results obtained by bronchoscopy in this series—44 bronchoscopies without a death. In 6 cases the foreign body was not found, but no deaths were directly attributable to the operation.

If a study of this series of cases can be taken as an index for all types of foreign bodies, no argument can be sustained in favor of the so-called expectant or symptomatic treatment. Of the 38 cases treated by this method, 16 died, while of the 38 cases receiving early bronchoscopic treatment all recovered. As regards the expectant treatment, Jackson says: "We do full justice to our patients when

we tell them that while the foreign bodies may be coughed up it is very dangerous to wait; and further that the difficulty of removing increases with each hour the body is allowed to remain."

When the amount of dental surgery being done is contrasted with the small number of dental objects aspirated, the dental profession is to be congratulated for its excellent surgical technique. Gardner, of the Mayo Clinic, employs the following technique for prevention of accidental aspiration of foreign bodies." The patient should be watched quite as carefully with a local anesthetic as with a general one. The use of gauze sponges in no way interferes with the work of the operation and cares also for the hemorrhage. Furthermore, the dentist may, by careful examination of the teeth before operation, ascertain if the work might displace pieces of tarter fillings or even the teeth themselves during the anesthetic. The condition of the patient undergoing any operation often requires the use of the gag during an ether anesthetic, and the anesthetist should know the condition of the patient's teeth before the anesthetic is started, since such an instrument often displaces from a tooth foreign bodies which might be inhaled.

CONCLUSIONS.

1 In every operation about the mouth care should be exercised to prevent aspiration infection.

2 Symptoms in most cases are immediate, namely, cough, pain in chest and hemoptysis.

3 Later symptoms may simulate pulmonary tuberculosis. Seven cases in this series were diagnosed as tuberculosis. Tuberculosis may co-exist with lung abscess.

4 Bronchoscopy is indicated in any case as a diagnostic measure if the history and X-ray findings are not conclusive.

5 When the presence of a foreign body has been definitely established there is only one treatment—bronchoscopy.

6 Expectant treatment is always hazardous and lung abscess may devlop at any time.

7 Death is due in most instances to lung abscess, bronchiectasis and gangrene.

Case report: Patient, I. F., age 50 years, was referred to me, Feb. 19, 1920, by Dr. B. L. T.

Patient gave the following history: Seven years ago was struck in the left temporal region by an axe, which rendered her unconscious. Since that time at various intervals she has been subject to attacks of epilepsy. Five years ago during an epileptic seizure, patient fell and struck her head upon a cement floor, a plate of false teeth was broken and a small portion of the plate was never found

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Arnolds, A.	23F	Artificial tooth plate	Lower right bronchus	While eating	Extreme dyspnoe; spasmodic cough	Two months	Thoracotomy operation twice interrupted on account of hemorrhage	Foreign body coughed up after operation complete recovery		One of the early instances of X-Ray localization. Bronchoscopy not attempted.
Abercrombie	?F	Artificial tooth	Not stated	Nature of accident not stated	Paroxysmal cough and dyspnea, becoming more frequent; purulent expectoration; rapid pulse	Two years and seven months	Not stated	Tooth coughed up; improvement, followed by return of symptoms, hemoptysis death		Bronchoscopy not attempted
Bayer, H.	9M	Deciduous tooth	Right bronchus		Pain in right side of chest	Not stated	Not stated	Death	Tooth causing lung abscess	Not diagnosed until autopsy
Brauch, T.	22F	Premolar tooth	Not stated	Teeth extracted under chloroform anesthesia	Slight dysponea, later lung abscess	Two years	None	Coughed up ultimate recovery		Bronchoscopy not attempted
Batchelder	65?	Set of teeth	Not stated	Not stated	Not stated	15 months	Coughed up	Recovery		Bronchoscopy not attempted
Barker	? ?	Tooth	Right bronchus	Not stated	Not stated	Not stated	Thoracotomy for removal of foreign body	Died while being chloroformed for operation	Gangrene and empyema	Bronchoscopy not attempted
Carpenter, W. G.	35M	Four false teeth on silver clamp	Right pleural cavity	Aspirated tooth in fit of coughing	First 11 ½ years occasional attacks of shortness of breath, fever, pain in chest cough, dulness of right chest	13 years	Symptomatic	Died 13 years after the accident	Fistula of lung opened into large empyema cavity containing pus. Lung collapsed denture with four teeth found in the pleural cavity. Left lung tubercular	Bronchoscopy not attempted X-Ray not made
Chambers, T. R.	35F	Molar tooth	Left bronchus	Extraction under gas	Severe epigastric pain, dyspnoe, nausea, prostration, elevation of temperature	Five days	None	Coughed up 6th day		All symptoms disappeared in five weeks. Bronchoscopy not attempted

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Childs, S. B.	24F	Molar tooth and portion of crown	Second bifurcation of the lower right bronchus	Extraction of teeth general anesthesia	Harassing cough diagnosed as T. B.	Several weeks	Bronchoscopic removal	Not stated		Probably recoverd but not stated. Successful broncoscopy
Clayton, T. A.		Tooth	Lower right bronchus							Successful broncoscopy
Cragie, (1834)		Artificial tooth	Not stated	Not stated	Chronic cough	Two years	Not stated	Tooth coughed up; temporary improvement, followed by return of symptoms, hemoptysis, death		Bronchoscopy not attempted. Death with symptoms of tuberculosis
Davies, J. D.	?F	Second bicuspid tooth	Right bronchus	Extraction under gas anesthesia	Pain in chest, severe cough, profuse expectoration	Seven mos.	No surgery	Coughed up and recovery		Diagnosed and treated as T. B. Bronchoscopy not attempted
Dickson, W. E. C.	28M	Stump of upper molar	Left bronchus	Extraction under gas	Cough with slight uneasiness behind the sternum no pain	13 ½ months	Symptomatic	Sudden recuring haemoptysis, coughed up tooth recovery		Diagnosed tuberculosis by several consultants. Bronchoscopy not attempted
Forbes, H. H.	82M	Gold crown	Right main bronchus	Aspirated while in dental chair	Coughing immediately	4 hours	Bronchoscopy	Removal		Located by X-Ray. Removed with Bruning type bronchoscope
Forbes, H. H.	47M	Tooth plate	Left primary bronchus	Aspirated while asleep	Not stated	Several mos.	Bronchoscopy	Removal cured		Removed by bronchoscopy. Located by X-Ray
Forbes,	39F	Root for tooth	Left bronchus	Extraction of teeth under general anesthesia	Within a few weeks a constant cough developed, accompanied by profuse purulent expectoration	16 months	Symptomatic	Coughed, lung abscess in left upper lobe, ultimate recovery		Bronchoscopy not attempted until foreign body had been coughed up and then for the purpose of treating abscess cavity

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Forbes, H. H.	42F	Tooth	Left primary bronchus	Extraction of teeth under general anesthesia ether	Cough and asthmatic attacks	Two months	Not stated	Bronchoscopy removal cured		Located by X-Ray and removed by bronchoscopy
Forbes, H. H.	35M	Dental filling	Left bronchus	Extraction of teeth under gas anesthesia	Immediate irritation in chest and cough	24 hours	Bronchoscopy unsuccessful on 2 occasions	Probably coughed up; cured		First and second pictures showed presence of foreign body. Third picture taken on 3rd day. Foreign body disappeared Bronchoscopy unsuccessful
Freidberg	24F	Tooth	Right bronchus	Extraction of ten teeth	Immediate cough, pain in right side late symptoms increased cough, foul sputum and fever, pain in chest, loss of weight	9 weeks	Foreign body removed in upper lobe. Bronchoscopy under ether 9 weeks after accident	Expectoration and cough continued for several months, future history unknown		Bronchoscopy successful
Friedberg, F. A.		Tooth	Lower part of right lung	Extraction of teeth under general anesthesia	Cough with expectoration	A number of months	Bronchoscopic removal	Lung abscess had developed symptoms abscess persisted after removal		
Fowler		Teeth	Lower left bronchus	Not stated	Not stated	Not stated	Thoracotomy failed	Patient died later	Tooth found impacted in a secondary bronchus	Bronchoscopy not attempted
Gardner, W. T.	29F	Crown of tooth	Right bronchus	Extraction of teeth under chloroform anesthesia	Elevation of temperature, cough, haemoptysis	15 months	No surgery	Coughed up and recovery		Diagnosed and treated as T. B. Bronchoscopy not attempted
Gill, E. G.	50F	Dental plate	Right bronchus	Aspirated during epileptic attack	Cough haemoptysis	Five years	Symptomatic, later bronchoscopic removal	Removal, complete recovery		Bronchoscopy successful

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Goodlee, R. J.	47M	Molar tooth	Lower right bronchus	Not stated	Extreme dysponea immediately, spasmotic cough purulent sputum, emaciation, signs of abscess	14 months	Drainage of abscess, no foreign body found	Died 14 mos. after accident	Advanced bilateral tuberculosis cavity of right apex tuberculosis of the caecum bilateral lower lobe, bronchiectasis tooth in lower right lobe of bronchus	Bronchoscopy not attempted
Getchell	24F	Root of tooth	Lesions in both bases most marked on left	Extraction of several teeth under ether	Immediate symptom—indefinite left pleurisy late symptoms pain, cough, foul sputum intermittent fever, haemoptysis pneumonia	2 weeks	Drainage of lung abscess	Expulsion 2 weeks after accident recovery		Recurrence of abscess. Bronchoscopy not attempted
Getchell	16F	Tooth	Right bronchus	6 teeth extracted under gas	Immediate ailing, late after 3 ½ mos. typhoid bronchitis in bed from 3 to 4 weeks breath offensive cough, foul sputum, chronic cough, purulent sputum	1 year	Postural treatment, much improvement	Expulsion 1 year after accident but results not known		Bronchoscopy not attempted
Hedblom	66M	Tooth	Right upper lobe of bronchus	Many teeth extracted	Immediate symptoms dull pain in lower right chest bled considerably cough, sputum with foul odor later symptoms, cough, and sputum for 4 wks. after teeth extracted chills, sudden expectoration of pint of foul pus	Five months	Thoracotomy for drainage of lung abscess	Complete recovery		Tooth discharged thru wound 5th month after operation. Bronchoscopy not attempted
Hedblom, (Mayo Clinic)	45M	Tooth	Not stated	26 teeth extracted under ether	Cough, foul sputum, fever dulness of right chest	Not stated	Thoracotomy for drainage of gangrenous lung abscess	Complete recovery		Bronchoscopy not attempted

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Hedblom (Mayo Clinic)	63M	Tooth	Not stated	Kicked by horse	Immediate symptoms cough for 24 hours tarry stool late symptoms 8 wks. after accident pneumonia, haemoptysis purulent sputum, pain in chest fever, loss of weight abscess broke	8 weeks	Thoracotomy for drainage of lung abscess	Complete recovery		Bronchoscopy not attempted
Hedblom (Mayo-Clinic)	39F	Tooth	Left lower lobe	Teeth extracted under ether	Immediate symptoms cough, late symptoms, moist rales tuberculosis breathing dulling of fingers, haemoptysis, chronic cough and foul sputum	Not stated	Thoracotomy for drainage of lung abscess	Complete recovery		Bronchoscopy not attempted
Hedblom, (Mayo-Clinic)	33F	Two teeth and silver filling	Right lower lobe	Teeth extracted under ether	Cough and purulent sputum, cupful each day	Two pieces of tooth in 6 weeks filling in 5 wks.	Thoracotomy for drainage of lung abscess. 1st stage of operation	Uncertain		Bronchoscopy not attempted
Hedblom, (Mayo-Clinic)	30F	Teeth	Right bronchus	Extraction of several teeth	Paroxysmal cough substernal pain on right, sweating frequent vomiting rales, increased breath sounds	Expulsion 3 months after accident	None	Recovery		Very little cough and sputum months after expulsion of teeth. Bronchoscopy not tried
Himmelsbach G. A.	21F	Tooth	Left Bronchus	Five teeth extracted under gas anesthesia	Periodic dysponea violent cough wheesing cough, sputum haemoptysis signs of bronchitis	4½ months	None	Complete recovery after coughing up tooth with cotton packed in cavity. Immediate relief of symptoms		Bronchoscopy not attempted
Hubbard		Tooth	Not stated	Dental operation	Immediate not stated, chronic cough purulent sputum	Several mos.	None	Spontaneous recovery after several months		Bronchoscopy not attempted
Hubbard		Tooth		Dental operation	Immediate symptoms not stated late symptoms chronic cough purulent sputum	Several years	None	Spontaneous recovery after several years		Not very ill at any time. Bronchoscopy.

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Hubbard	34F	Disc Allen's dental cement 7x9mm.	Left lower lobe bronchus	Extraction of 22 teeth under ether	Immediate cough almost continuous during waking hrs. Late symptoms, fever cough foul muco-purulent sputum, emaciation, tuberculosis diagnosed	7 months.	Bronchoscopic removal 7th month	Recovery perfect gain in weight 34 lbs.		Bronchoscopy successful
Huston, (cited from F. A. Hoffman)	20F	Molar tooth	Right bronchus	Not stated	Pneumonia pleuritis	11 days	Not stated	Death		
Hickey, P. M.	21F	Tooth and part of crown	Right bronchus	Extraction of teeth under gas anesthesia	Severe cough	Five months	Bronchscopy (peroral) unsuccessful tracheotomy. Bronchoscopy 3 tracheal openings	Tooth removed complete recovery		Patient treated for T. B. for 5 mos. Bronchoscopy done under ether anesthesia
Ibid (cited from F. A. Hoffman)	39F	Tooth	In bronchus exact location not stated	Not stated	Consolidation upper right lung followed by ulceration of bronchus and abscess after tooth coughed up	Not stated	Not stated	Death		Bronchoscopy not attempted
Ibid (cited from F. A. Hoffman)	27F	Tooth	Right bronchus	Not stated	Cough, fever, impaired resonance over right lung posteriorily, purulent sputum	12 weeks	Not stated	Coughed up recovery		Not diagnosed as foreign body until coughed up bronchoscopy not attempted
Ibid (cited from F.)	30F	Tooth	Right bronchus	Not stated	Coughed up blood and pus. Abscess of lung	Not stated	Treachotomy	Death		Doesn't state how diagnosis was made. Bronchoscopy not attempted
Israel, J.	26M	Fragment of tooth	Left lower lobe	Not stated	Immediate symptoms not stated later symptoms pain in left chest, purulent sputum, sinuses and retraction of chest wall marked emaciation pus contained. Actinomyeotic rosettes	1 ½ years	No surgical treatment	Died 1 ½ years after onset of symptoms	Cavitation in left lung fragment of tooth in plural cavity	Patient a hucster, drank out of the same trough as his horse, bronchoscopy not attempted

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Jackson, C.	26F	Amalgam tooth filling	Left lung	Extraction under gas anesthesia	Late symptoms, severe coughing paroxysms and sweating, no immediate symptoms	Two weeks	Bronchoscopy	Removal, complete, cured		Foreign body located by X-Ray. Successful bronchoscopy
Jackson, C.	39?	Dental instrument	Right inferior lobe	Not stated	Not stated	7 days	Not stated	Extraction cure		Slight local congestions. Broncoscopy successful
Jackson, C.	30?	Dental instrument	Left upper lobe bronchus	Not stated	Not stated	3 months	Not stated	Extraction cure		Areola inflammation patch of purulent exudate. Successful bronchoscopy
Jackson, C.	26?	Dental instrument	Right middle lobe bronchus	Not stated	Not stated	2 days	Not stated	Extraction cure		Small faint areola at point of puncture, bronchoscopy successful
Jackson, C.	51?	Portion of tooth	Right lower lobe bronchus	Not stated	Not stated	4½ years	Not stated	Extraction		Four bronchoscopies done at intervals. Myocardial disease
Jackson, C.	18?	Dental instrument	Posterior branch of left inferior bronchus	Not stated	Not stated	1 month 9 Days	Bronchoscopy	Extraction cure		Trachea red and inflammatory in marked contrast to pallor of the pharyngeal, mucosa; left bronchus high degree of inflammation with adherent globular masses of thick tough secretion
Jackson, C.	21?	Dental instrument	Right upper lobe bronchus	Not stated	Not stated	15 days	Not stated	Extraction cure		Bronchoscopy successful
Jackson, C.	43?	Band of gold crown	Left lower lobe bronchus	Not stated	Not stated	13 days	Not stated	Extraction cure		Intense laryngitis, exudaye granulation tissue
Jackson, C.	45?	Dental instrument	Right inferior lobe bronchus	Not stated	Not stated	10 days	Not stated	Extraction cure		Very slight localized bronchitis
Jackson, C.	12?	Tooth	Right stem bronchus	Not stated	Not stated	3 months	Not stated	Extraction cure		Bronchoscopy successful

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Jackson	22F	Tooth	Branch of the right inferior lobe bronchus	Not stated	Not stated	51 days	Not stated	Extraction cure		*See Footnote.

* First attempt—One branch of middle lobe bronchus and one branch of inferior lobe bronchus swollen shut. Except for a small lumen it was filled with a bed of pus in each case. Both swollen bronchial orifices were dilated with forceps used during expansion. The orifice of both bronchi contained granulations and in the middle lobe bronchus there was a hard substance palpable with forceps, but it was not free to move. Second attempt—Orifice of branch of middle lobe bronchus seemed to be normal in the inferior lobe bronchus the anterior branch which before was seen to be swollen shut; was more patulous though occupied by granulation tissue. This was removed and the orifice dilated with forceps. Tooth found with one end presenting. This was seized and tooth found to be freely movable and came away on very gentle traction, 6 min. 25 sec.

Jackson, C.	63?	Gold crown	Right lower lobe bronchus	Not stated	Not stated	12 days	Not stated	Extraction cure		Unfavorable presentation converted to favorable one by version
Jackson, C.	31?	Root of tooth	Right stem bronchus below largest posterior branch	Not stated	Not stated	Not stated	Not stated	Extraction cure	Not stated	** See Footnote.

** Trachea and carina inflamed; right stem bronchus below upper lobe bronchus very red and the mucosa swollen. Granulations filled stem bronchus below middle lobe bronchus. Right inferior lobe bronchus bromchiectatic. Considerable quantities of pus and blood kept coming constantly up from the inferior lobe branch bronchi. Odor of breath and pus characteristically saprophytic but not quite so foul as in most foreign body cases of prolonged sojourn.

Jackson, C.	44?	Gold 3 tooth bridge	Right main bronchus at orifice of upper lobe bronchus	Not stated	Not stated	Five days	Not stated	Extraction cure		Localized bronchitis pus, size of foreign body 3 cm.x1.5 cm. circumference 4 cm.
Jackson, C.	45?	Portion tooth plate	Left main bronchus	Not stated	Not stated	Four months	Not stated	Extraction cure		Foreign body lying free in left bronchus above orifice of upper lobe bronchus Slight degree of localized reaction only. Right bronchus and trachea looked normal
Jackson, C.	29?	Tooth	Right stem bronchus	Not stated	Not stated	8 months	Not stated	Extraction cure		*** See Footnote.

*** Large mass of granulation tissue in right stem bronchus just below the orifice of the middle lobe bronchus. Bronchial wall stenosed apparently by perichondritis the proximal swelling quite firm.

Jackson, C.	14?	Tooth	Right main bronchus	Not stated	Not stated	23 days	Not stated	Extraction cure		**** See Footnote.

**** Right main bronchus swollen almost shut outline eliptical, axis from 10 to 4 o'clock walls collapsed to contact during expiration opening again during inspiration middle lobe bronchial orifice completely cesed by swelling and compression of the tooth, tooth found body upward, in stem bronchus the top of the body being flush with the spur between the middle lobe brocnhial orifice and inferior lobe bronchial orifice. As soon as tooth was disturbed by sponging away the blood stained secretion large quantities of pinkish pus were liberated. The pus having the same foul odor as the breath as noted at the start of broncboscopy.

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Jackson, C.	49F	Amalgam tooth filling	Lung tissue of right lower lobe	Not stated	Not stated	7 months	Not stated	Extraction cure		Lower lobe bronchus intensely inflamed pus coming up from small median branch
Jackson, C.	29?	Tooth	Right stem bronchus just below orifice of middle lobe	Not stated	Not stated	66 days	Not stated	Extraction cure		Bronchoscopy successful
Jackson, C.	30?	Gold crown	Right main bronchus at orifice of middle lobe bronchus	Not stated	Not stated	Two days	Not stated	Extraction cure		Mucosa of entire tracheobronchial tree much reddened. No granulations present. Some mucopus
Jarvis	50M	Tooth and crown	Left bronchus	Extraction of lower left wisdom tooth	Dysponea cough, great prostration fever, sibilant rales slight sputum	Five days	None	Spontaneous expulsion five days after accident recovery		Root and crown expelled in violent paroxysm of coughing with haemoptysis
Hug, T.	30M	Dental plate	Right main bronchus	Aspirated during sleep	Difficult breathing	3 days	Bronchoscopic removal	Removal recovery		Located by X-Ray, plate consisted of three teeth. Upper bronchscopy. Patient sitting
King, J. W.	23F	Molar stump	Not stated	Extraction under gas	Pain in chest and constant dry cough	10 days	None	Tooth coughed up recovery		Foreign body not suspected until coughed up. Bronchoscopy not attempted
Korteweg, J. A.	23F	Artificial tooth	Right bronchus	Aspiration	Harassing cough	2 months	Thoracotomy	Tooth not found coughed up 4 hrs. after operation recovery		Bronchoscopy not attempted
Kulbs	48M	Piece of carious toot'	Upper right lobe	Not stated	Immediate, not stated. late- four hundred c. c. of foul sputum containing elastic tissue fibres; signs of cavity duration of symptoms 3 months	One month	Thoracotomy for drainage of lung abscess	Marked improvement small fistula two months after operation		Bronchoscopy not attempted

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Landis, H. R. M.	34M	Wisdom tooth	Right bronchus	Teeth extracted under gas anesthesia	Severe pain in right chest, constant cough loss of weight and night sweats	14 months	Sanitorium treatment for T. B. Thorocatomy and pus evacuated	Tooth coughed up, recovery		Bronchoscopy not attempted
Leaming	?M	Tooth	Bronchus	Not stated	Not stated	One day	Tracheatomy	Coughed up several hours after operation recovery		Bronchoscopy not attempted
Martin, C. F.	27F	Tooth	Right bronchus	Extraction of teeth under ether anesthesia	Pain in chest, cough expectoration of purulent material fever and night sweats	Several weeks	Artificial pneumothorax	Recovery		X-Ray showed abscesses cavity Bronchoscopy not attempted
Friedberg, F. A.	35M	3 tooth bridge	Left main bronchus	Aspirated during intoxicated stupor	Cough moderate dyspnoca, soreness on pressure	Not stated	Removed with fluorscopic bronchoscopy	Recovery		Ordinary bronchoscopy failed on account of hemorrhage from lungs
Friedberg, F. A.	46M	Dental broach	Left main bronchus	Dental operation	Cough	3 days	Not stated	Broach coughed up, recovery		Bronchoscopy not attempted on account of inability of patient to open mouth
Lynch, R. C.	2F	Plaster of Paris	Pieces in both lungs	Inhaled during modeling for false teeth	Cough	5 years	Bronchoscopic removal	Marked constriction of bronchioles dilated at time of removal, recovery		Bronchoscopy successful
Lynch, R. C.	?F	Plaster of Paris	Left bronchus	Making cast of mouth	Persistent spasmodic cough	5 years	Bronchoscopic removal of plaster of Paris from lungs	Complete recovery gained 30 lbs. in weight		Bronchoscopy successful
Mayer, E.		Gold crown of wisdom tooth	Not stated	Dental operation under rectal anesthesia	Not stated	Not stated	Bronchoscopic removal	Recovery		Bronchoscopy successful
MacCormack W.	24F	Blades of tooth forceps	Right bronchus	Teeth extraction forceps broke chloroform	Immediate violent spasmodic cough, extreme cyanosis severe cough in chest, late symptoms cough dyspnoea pain in right chest	Not stated	Tracheotomy. Instrumental removal	Complete recovery		Great difficulty experienced in getting hold of blade. Does not state whether bronchoscope was used

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Medico Leggal Reports		Porcelain tooth	Right bronchus	Not stated	Not stated	3 years	None	Spontaneous expulsion after 3 years		Verdict for plaintiff; damages 750 pounds. Bronchoscopy not attempted
Murphy, J. W.	37F	Porcelain tooth	Right lower bronchus	Extraction under gas anesthesia	None	5 days	Bronchoscopy	Cured		Bronchoscopy successful after second attempt
Manger		Dental burr	Trachea	Not stated	Not stated	Not stated	Tracheotomy burr not found	Recovery		Burr probably coughed up into nasopharynx during tracheotomy. Anesthesia spat out next day
Miller, J.		Tooth	Not stated	Not stated	Not stated	Not stated	Not stated	Lung abscess developed		No details of this given, simply noted in a general treatise of lung abscess
Moure, E. J. and Got, A	40M	Tooth	Right bronchus	Not stated	Not stated	One day	Bronchoscopy partially successful finally tracheotomy	Recovery		No detailed case history, no further date given in table
Murrell, W.	22F	Tooth root	Bronchus not exactly located	Extraction of teeth under general anesthesia	Cough at first dry, later with offensive expectoration pain left chest, fever	2 years	Symptomatic medical serum	Tooth root coughed up temporary relief of cough followed by chronic bronchiectasis that persisted for 6 years		No X-Ray, protion of tooth root not exactly determined, operation refused by patient for bronchietasis Vaccine treatment to be given, results not reported Bronchoscopy not attempted
Monroe, T. K.	10M	Tooth	Left bronchus	Loose tooth probably aspirated operation for tuberculosis of knee under ether	Immediate symptoms none, late symptoms cough and fever on 4th day rales, loss of vocal fremitus; offensive sputum 14th day	16 days	Symptomatic	Died 16 days after accident	Entire lung gangreneous	Bronchoscopy not attempted

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Morrison, R.	34F	Tooth	Left bronchus	6 to 8 teeth extracted under ether	Immediate symptoms dysponea tightness in chest, said tooth had gone down in throat later symptoms after 3 wks. cough, fever, haemoptysis profuse fetid sputum loss of weight and strength	2 years	Thoracotomy, resection of large parts of lower of lung	Died of pericarditis on 28th day after operation	Pericaditis tooth stump impacted in bronchus missed resection ¾ inch	Diagnosis of bronchiectatis from foreign body was made only after two years of symptoms
Poulet, A.	?M	Root and portion of crown of molar tooth	Right bronchus	Extraction of teeth under general anesthesia	Catarrhal cough, attacks of pleurisy	One year	None	Death	Right lung was adherent exudation marked piece of tooth in hilus of right bronchus	Bronchoscopy not attempted Patient died with tuberculosis
Pepper		Deciduous tooth	Not stated	Not stated	Not stated	Not stated	Spontaneous coughed up	Recovery		Bronchoscopy not tried
Pirie	?M	Tooth		Extraction of several teeth	Late symptoms bloody expectoration, chills, pains in left side duration 6 days	Not stated	Thoracotomy for drainage	Complete recovery		X-Ray showed fluid level in abscess cavity. Bronchoscopy not attempted
Page, L.	46M	Portion of tooth	Right lower lobe	Teeth extraction under gas anesthesia	Cough and pain in right chest elevation of temperature	Several days	Bronchoscopy	Removal after second attempt		Bronchoscopy successful
Patterson,	54M	Molar tooth	Posterior branch of the right lower lobe bronchus	Extraction of teeth under general anesthesia	Constant cough expectoration of foul pus loss of weight	One year	At first systematic, later bronchoscopy	Removal of tooth, recovery		Bronchoscopy successful. Abscess formed
Purcell, C. E.	50F	Tooth root	Not stated	Extraction of teeth under general anesthesia	Cough, with expectoration, fever and nervousness	One month	Symptomatic	Tooth root coughed up expectoration of purulent material for a few days then complete recovery		No X-Ray made in this case and exact position of foreign body determined. Bronchoscopy not attempted
Robinson, (Mayo Clinic)	34F	Tooth	Right lower lobe	Teeth extracted under ether	Immediate symptoms cough, sputum pain in back, late symptoms cough, pint of foul sputum in 24 hrs. pain in chest, fever emaciation	8 months	Bronchoscopy, pus in right bronchus aspirating left pleural cavity pus, first stage operation drainage abscess of left lung	Died shortly after thoracotomy operation	Bilateral, bronchiectasis left empyema tooth in lower lobe of right lung	Tooth within 2.5 cm. of inferior surface of the lower lobe. Bronchoscopy unsuccessful

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Rinut, C. A. S.	22M	Tooth plate	Right bronchus	Swallowed during attacks of petitmal	Cough and pain in chest	2 days	Removal thru tracheotomy wound	Good recovery except slight bronchitis		One-half of the tooth plate was in the bronchus the other half passed per rectum, having been swallowed. Doesn't state that bronchoscope was used
Roush, S. A.	35M	Molar tooth	Not stated	Tooth loosened by a blow and supposed to be swallowed	Cough with occasional hemoptysis, weakness, and other symptoms suggesting tuberculosis	Six years	Hygienic and tonic	Tooth coughed up during attacks of coughing due to severe cold. Symptoms disappeared rapidly		Bronchoscopy not attempted
Schlittler, E.	35M	Nerve canal reamer 5 to 6 cm. long	Bronchus the right lower lobe X-Ray findings	Dropped into throat in the dental chair, later pushed down in an unsuccessful attempt to remove it.	None	3 mos. at the time of attempted bronchoscopic removal. Patient reported again 1 mo. later	Unsuccessful bronchoscopy under local anesthesia foreign body not found when indicated by X-Ray	No symptoms at any time, & physical X-Ray examination showed lung normal		Bronchoscopy not successful
Smith, H.	?M	Dental burr	Upper outer lobe left lung	Drilling tooth dentist dropped burr	None	A few days	Four unsuccessful bronchoscopies partial pneumonectomy	Death followed operation, burr obtained		Dr. Jackson was of the opinion that owing to the position of the burr, it could not be removed with the bronchoscope
Sander, (cited from T. A. Hoffman, Nothnagel's practise of Medicine)	20F	Portion of tooth	Right bronchus	Extraction of teeth	Dyspnea and cough	One month	No surgery	Coughed up. Death		Records not complete. Bronchoscopy not attempted
Schulz, J.	47M	Molar tooth	Bifurcation of two bronchi in right lung	Aspiration of tooth (not stated whether during extraction or not)	Cough and purulent expectoration, occasionally blood tinged, pain dyspnea, weakness	About a year and a half	Rib resection and drainage	Temporary improvement followed by return of symptoms, death	Advanced tuberculosis in both lungs with large cavity in right bronchiectasis. Tooth found in bronchial bifurcation	Bronchoscopy not attempted

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Schulz, J.	23F	Tooth root	Not stated	Aspirated during extraction of teeth	Those of lung abscess (not detailed)	5 months	Rib resection and drainage of abscess	Presence of tooth caused gangreneous abscess, cured by operation good recovery		Tooth root not found
Shurly, R.		Tooth	Not stated	Teeth extracted under gas	Immediate cough	Not stated	Tracheotomy, bronchoscopy	Foreign body removed, recovery		Bronchoscopy successful
Shurly, R.	?F	Rubber from dental mouth gag	Not stated	Teeth extracted under gas	Immediate symptoms cough, odor of rubber, air to lower lung cut off	Not stated	Bronchoscopic removal	Not stated		Foreign body slipped back into trachea
Shurley, R.	49M	Dental burr	Lower left bronchus	Drilling of teeh	Not stated	10 days	Bronchoscopic removal about 10 days after accident	Complete recovery		Bronchoscopy successful
Strange, W.	23F	Part of tooth	Right bronchus	Unsuccessful attempt at teeth extraction. Part of tooth loosened under gas	Immediate symptoms not stated. Late symptoms of gangreneous abscess	Not stated	Thoracotomy for drainage of abscess, tooth not found	Complete recovery		Bronchoscopy not attempted
Thomson, St. C.	10F	Tooth	Left bronchus	Inhaled from towel on waking after anesthesia under gas	Immediate wheezy respiration, physical examination after several days, very little air entering lung. Late symptoms after 2 mos. fever and other symptoms of abscess	Two months	Two unsuccessful bronchoscopies before abscess formation tracheotomy; lower bronchoscopy, foreign body removed 2 months after accident	Complete recovery		Small absceess cavity behind tooth; pus released on pulling tooth from bronchus
Tees, F.	28F	Tarter from teeth	Right lung	Excessive tarter on teeth some inhaled	Cough with slight expectoration; pain in chest and back on right side	Five days from onset of symptoms	Drainage of pleural cavity on account of pyopneumo thorax	Pyopneouma thorax developed secondary to an abscess of the lung, death	Small piece of tarter found in abscess in right lung connecting with inter lobe abscess and so with pleural cavity	Bacteria in fluid withdrawn from pleural cavity similar to those found around the teeth. Bronchoscopy not attempted
Traversieur	F	Fragment of tooth root		Tooth extraction under general Anesthesia	Cough, dyspnea fetid expectoration fever and weakness	Two months	Not stated	Symptoms indicated a pulmonary abscess; tooth fragment coughed up immediate relief and good recovery		No X-Ray study and no attempt at removal; exact location not determined

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Accident Nature of	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Verco, J. C.	27F	Tooth	Right bronchus	Teeth extracted under gas	Immediate severe cough profuse perspiration fever, pain in chest tasted and smelled tooth. Late symptoms cough, fetid sputum, fever dulness in right base	12 weeks	Symptomatic	No record		About 12 weeks after the accident coughed up tooth bronchoscopy not tried
Verco, J. C.	39F	Tooth	Right bronchus	Teeth extracted under gas	Immediate symptoms, fever, cough, with sputum having odor and taste of bad teeth, late symptoms, cough, fetid sputum, fever	3 weeks	Symptomatic	Expulsion 3 wks. after accident died from suffocation following sudden bursting of abscess		Abscess burst 2 months after tooth extraction
Wallace, T.	M	Tooth plate with 3 artificial teeth	Bifurcation of right bronchus	Aspirated during a fit of coughing	Cough difficulty of, breathing, soreness on right side morning expectoration of purulent sputum	46 days	Not stated	Tooth plate coughed up, improvement but some expectoration persists		
Webster, A. E.	?	Tooth root	Right lung	Teeth extracted under gas anesthesia	Cough increasing in severity and frequency, purulent expectoration with some blood. Nervousness and weakness	About 5 mos.	Symptomatic largely sedative	Tooth root coughed up, improvement followed but some cough and expectoration continued		The X-Ray showed a small opaque shadow both before and after the tooth was coughed up Its nature was not determined
Wall, C.		Tooth stump	Not stated	Aspirated while under anesthesia	Early symptoms cough with purulent expectoration	Not stated	Bronchoscopy attempted on 2 occasions but failed	Not stated		Two unsuccessful bronchoscopies
Warrack, J. S.	26F	Tooth	Left bronchus	Teeth extracted under gas anesthesia	Immediate symptoms, extreme cyanosis, tightness of throat dyspnoea hard, dry paroxymal cough, wheezy respiration. Late symptoms hectic temperature 13th day offensive breath, brown, foul smelling sputum cough	16 days	None	Died 16 days after accident	Complete obstruction of left main bronchus whole lung gangrenous crowned bicuspid tooth wedged into bronchus ball value obstruction	Bronchoscopy not attempted X-Ray picture not made

Dental and Surgical objects (continued)

Author	Age Sex	Foreign Body	Location	Nature of Accident	Symptoms	Sojourn	Treatment	Results	Post Mortem	Remarks
Wigg, A. E.	30F	Tooth	Right bronchus	Tooth slipped from forceps during extraction of teeth	Immediate slight cough, late symptoms violent cough, purulent sputum, haemoptysis fever, pain in chest, dulness in right base	3½ weeks	Thoracotomy performed to facilitate expulsion	Died 3½ wks. after accident	Large empyema small abscess in middle lower lobe, bicuspid, tightly impacted	Bronchoscopy not attempted X-Ray negative
Wall C.	37F	Artificial tooth plate	Right bronchus	Not known how it was inhaled no dentistry at the time	Cough with copious expectoration wasting, night sweats	Over 9 mos.	Symptomatic	Secondary bronchitis and bronchiectasis death due to latter	Tooth plate found in right bronchus secondary bronchiectasis of right lower lobe Septic pneumonia in left lung	Bronchoscopy not attempted. Remarkable that a large foreign body inhaled in to the bronchus produced no symptoms until secondary bronchitis developed
Wall, C.	?F	Stump of tooth with two fangs	X-Ray did not show foreign body	Teeth extraction under gas	Cough with copious expectoration, ofensive sputum	Two and half years	Symptomatic	Bronchiectasis developed. Tooth coughed up, symptoms relieved. Recovery		Cough did not begin until 13 months after tooth extraction. Bronchoscopy not attempted
Clayton, T. A.	40F	Molar tooth	Right bronchus lower lobe	Not stated	High fever	Not stated	Tracheotomy, removal by bronchoscope thru opening	Recovery		Bronchoscopy successful thru tracheal opening
Not stated (cited from G. B. Wood, Phil M. M. 1899)	??	Tooth	Left bronchus	Not stated	Not stated	Not stated	Symptomatic	Death		Bronchoscopy not attempted
Not stated (cited from G. B. Wood, Phil. M. M. 1899)	??	Tooth	Lung	Lost during extraction of teeth	Not stated	Not stated	Thoracotomy for lung abscess	Recovery		Bronchoscopy not attempted
Not stated (cited from G. B. Wood, Phil. M. M. 1899)	??	Tooth	Left bronchus	Lost during extraction of teeth	Symptoms of bronchitis	13 days	Removed by operation nature not stated	Recovery		Does not state nature of operation but most likely thoracotomy

but the patient and her family dismissed it as being lost. Shortly following the accident the patient began having an itching and tickling sensation in her throat, which gradually developed into a cough and became steadily worse, more so at nights. Eighteen months after this injury the patient was bending over in order to clean a spring house and at this time had a hemorrhage. She had hemorrhages at various intervals since, but only when stooping over. The patient's chest was X-rayed at the sanitarium where she was being treated and the presence of a foreign body was discovered in the right bronchus. She was then questioned as to the history of having aspirated a foreign substance into her lungs and recalled that she had broken her dental plate five years before and that a small portion of it was lost at the time of the accident.

I referred the patient to Dr. J. T. McK. for further X-ray examination and the following is his report:

"Stereoroentgen examination, with antero-posterior and postero-anterior plates of I. F.'s, chest shows a foreign body more or less oblong in shape, about 1¼ c.m. by 1 c.m. in size, lying obliquely in the inferior or descending branch of the right bronchus, the foreign body is lying opposite the ninth rib using posterior markings and opposite the fourth interspace using the anterior markings. There is considerable pathology noted at the base of the right lung, involving to some extent the parenchyma of the lung, a small emphysematous area present. There is a marked peribronchial thickening and fibrosis of the branches of the descending bronchi. The possibility of there being a few adhesions around this foreign body should be taken into consideration. No definite areas of tuberculous infiltration are seen in either lung."

The following is report of Dr. B. L. T., physician in charge at the tubercular sanitarium where the patient was treated.

"On admission to the sanitarium she gave her history as follows: Usual diseases of childhood, good recovery. Otherwise negative. Was perfectly well until five years ago. Illness began with tickling in throat, had cough, profuse expectoration, small hemorrhages, loss of strength, night sweats, with moderate rise of temperature at times. This patient was diagnosed as having tuberculosis and was admitted to another sanitarium. I have no record of her exact stay at this institution but I think it was at least three weeks. She was admitted to our sanitarium Apr. 2, 1919. Physical examination showed a few fine rales in the right apex with slight broncho-vesicular breathing and slight increased whispered fremitus with dullness. In the right back she had a few scattered rales from the third to the sixth dorsal spine. On admission, her sputum showed positive Gaffky two. The

day after admission, she had a pulmonary hemorrhage of about a dram of blood. She continued from time to time to have heavy streaks or slight hemorrhages, none of which exceeded an ounce during her stay here. Cough was severe and expectoration profuse in the morning. During the rest of the twenty-four hours, cough and expectoration slight. She had several convulsions, which were probably epileptic in character. This patient was kept in bed almost continuously on account of her tendency to hemoptysis. Her symptoms did not appear to improve after several months continued rest in bed, but on the other hand her expectoration increased in amount. The profuse expectoration and the slight physical findings led us to believe that possibly this patient had a deep seated cavity or a bronchiectasis and she was advised to have stereoscopic X-ray plates taken. The X-ray showed a foreign body in the right lung behind the fifth rib. This body appeared to be something over a half of an inch in diameter and gave the appearance of possibly being a flattened bullet of about a .32 caliber. On close questioning the following facts were brought out which the patient did not give in the history on admission. She said that about seven years ago she was walking behind a man who was cutting wood and was accidentally struck over the right eye by the pole of the axe. Since that time she had been subject to fainting spells, which we had diagnosed as epilepsy. And that about five years ago in one of these attacks she crushed her plate of false teeth. After the attack was over she felt as if a part of this plate had lodged in her wind pipe and that her cough and expectoration dated from about that time. Repeated examinations of her sputum were constantly negative except the first examination which was made on admission. The patient was advised to have an operation performed to have this foreign body removed."

On Feb. 29, 1920, I sent the patient to the hospital and on Mar. 1, 1920, under ether anesthesia, I removed the foreign body from the right inferior bronchus. Time of operation, ten minutes. I used the Jackson adult bronchoscope and Jackson's alligator rotation forceps for extraction of the foreign body. The adhesions surrounding the foreign body were very adherent and when the foreign body was pulled away a slight hemorrhage followed. I am greatly indebted to Dr. J. T. McKinney for his accuracy in locating this foreign body and for the skillful manner in which he used the fluoroscope at the time of the operation. Patient had a slight hemorrhage following the operation. There was a slight elevation of temperature for two days. The uncontrollable cough from which the patient had suffered for the preceding five years disappeared the second day following the operation, not to return.

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See also HEDBLOM, M'GREGOR, MARTIN and TRAVERSIEUR, under Case Report.

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TWO INTERESTING FOREIGN BODY CASES.

Dr. Morris E. Newman, Buffalo, N. Y.

Case 1: J. S.; male, age 55, inmate in a state mental institution, weight 325. History shows that reference was made by the patient that he had swallowed a nail some three weeks previous but had immediately refused the statement. In as much as he showed no outward symptoms, little attention was paid to him. He seemed to enjoy his meals and had no respiratory distress. About three weeks later he complained of gastric discomfort and difficulty in breathing. An indirect mirror examination was made by one of

the staff men, but no pathology was seen. Increase in symptoms called for an X-ray examination, which showed a curved nail was lodged in the upper part of the esophagus. Attempts at removal, both under local and general anesthesia, were to no avail, by the indirect method, even though the nail could be felt in the forcep's grasp. The writer was called to see the case a few hours after. An ether anesthesia had been given, so there was little difficulty in passing an esophagoscope. The posterior pharyngeal wall, epiglottis, arytenoids and esophageal opening were edematous. Just above the second constriction of the esophagus the curved shaft

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of the nail was seen, with both ends pointing upward and through the mucosa. Many points of ulceration were demonstrated. Due to the poor condition of the patient and in the presence of such a large amount of edema, no attempt at removal at this time was made. Patient was sent back to ward with instructions to pack neck in ice and remove him into the city, where closer watch could be made. Early the next morning the symptoms of dyspnea increased, followed by a state of coma, and in spite of a hurried tracheotomy the patient expired.

An autopsy was performed and palpation of the esophagus, *in situ*, revealed both ends of the nail through the wall. Section showed four ulcerations, two from the shaft and two from each of the points where they exited.

The unusual feature of this case is the absence of pain for such a long time and the ability to eat in the presence of so large a foreign body. Our attention must be called to the importance of early X-ray examination and the early removal of foreign bodies with instruments devised for that type of work.

The photographs herewith demonstrate the condition of the tissues above and about the foreign body, the position of the nail, and the areas of ulcerations.

Case 2: Helen H., age 5. Had a persistent cough, expectoration and loss of weight continuing over a period of seven months. The parents were informed the youngster was a victim of tuberculosis and preparations were being made to send her away for this condition. One evening the child was taken with violent coughing and shortness of breath. The family not being able to locate their regular physician, called a nearby physician. He succeeded in quieting the youngster and ordered an X-ray in the morning. Same was done and the result is shown herewith in the photograph.

Bronchoscopy was performed under local anesthesia and the foreign body, which was a many-sided red glass bead, was removed from the right main bronchus.

All coughing and expectoration has disappeared, the child has gained weight rapidly and is the picture of health.

Attention must be drawn in this case to the need of more careful examination with the viewpoint of possible foreign body lodgments and the urgency of early X-ray diagnosis.

468 Delaware Avenue.

IMPROVED LOCAL ANESTHESIA FOR BRONCHOSCOPY IN ADULTS.*

Dr. M. C. Myerson, Brooklyn, N. Y.

More and more the importance of bronchoscopy and esophagoscopy becomes recognized. It is no longer limited to the mechanical, although life saving removal of foreign bodies, but it has become a factor in the diagnosis as well as in the treatment of conditions that have heretofore resisted all our efforts toward cure. Any advance or improvement that will make for the greater comfort or ease of the patient should be presented and improved upon, if requisite.

In this connection the writer presents an improved technic for the application of local anesthetic in performing bronchoscopy in adults. This improved technic refers entirely to the employment of cocain solutions of the proper strength. It has been noted that the application of the solution to the pyriform sinuses does not influence the reaction of the trachea and bronchi to the passage of the bronchoscope

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*Department of Laryngology, King's County Hospital, Service of Dr. Hubert Arrowsmith.

or instrumental manipulation. We find that the employment of laryngeal applicators of one type or another irritates the tissues and must surely cause some local reaction, for several applications are necessary, and the intensity of the contact is dependent more upon the reflex irritability of the patient's structures than upon the gentleness of the applications. This is particularly so in the region of the larynx. It is not an unusual experience to see a patient cough and expectorate blood streaked mucus immediately after the application of cocain solution in this manner.

The following method gives a total absence of pain and discomfort to the patient.

Following the suggestions made in the report of Emil Mayer's committee on local anesthetics, all solutions used for anesthesia, whether used as a swab, or by any other method, are carefully measured. For swabbing purposes 1 or 2 c.c. of a 10 per cent solution are placed in a graduated measure, so that when the cotton swab is soaked with the solution and pressed out, we can state with a degree of confidence that not less than a certain amount of the cocain solution has been used. In this manner an application of 10 per cent cocain solution is made to the gingival margin of the upper jaw twice, observing a three minute interval. Then with the use of any type of laryngeal syringe that is serviceable, not more than 1 c.c. of a 5 per cent solution is slowly instilled into the larynx just before the patient is placed upon the table! In emphasizing this manner of application we avoid the laryngeal reflex, all the fluid practically remaining, and the former coughing and expelling of solution is avoided; complete anesthesia is produced. Two or three minutes after the laryngeal instillation an intratracheal injection is made of 1 c.c. of 5 per cent solution, none of which is expelled, and all of which finds its way into the tracheo-bronchial tree. This latter introduction of the anesthetic solution gives a thorough and complete tracheo-bronchial anesthesia. The solution apparently not only anesthetizes the carina area, but also finds its way into the larger bronchial elements on either side. The tracheo-bronchial tree has been found to be very tolerant of cocain; this is substantiated by the statement in the report of Emil Mayer and his commitee that the bladder and bronchi are especially tolerant to local anesthetics.

This method of induction of anesthesia is superior to the applicator method in that there is no irritation due to contact.

It is also an improvement upon the bronchoscopic atomizer in that it produces anesthesia completely and rapidly before the introduction of the bronchoscope; while the atomizer is used through a broncho-

scope that is causing the patient to cough and struggle and react to its introduction, a phase that is entirely absent in the proposed method.

That there is assuredly less danger of toxicity and habit formation with the proposed method than with any other, especially as the larger doses formerly used are greatly reduced, and that we have here a technic which is superior can be readily understood.

This method of inducing anesthesia commends itself to the bronchoscopist, first because of the elimination of the distress which is always present to some degree when the present accepted method is employed, and secondly because, by its use the impression that bronchoscopy is dangerous and formidable will be greatly dispelled. This technic has been employed by the writer for over a year. During this time there has been no necessity for a nurse or assistant to hold the patient's shoulders to the table to help control him, as is practiced in most clinics.

The swabbing requires 1½ grs. of cocain. This part of the technic it is thought can be entirely eliminated, the writer having omitted it in the last few bronchoscopies with no undesirable effect. The instillation requires 1½ grs. of cocain, which is indeed a very small quantity.

Thanks are due Dr. Emil Mayer and Dr. Arrowsmith for their kind suggestions.

198 Lincoln Place.

THE WARING SUCTION TONSILLECTOMY—IS IT WORTH WHILE?

Dr. Fred W. Bailey, Cedar Rapids, Iowa.

In considering the various methods used for the enucleation of tonsils, there are two methods which stand far ahead of all others. These methods are the dissection and snare method, and the Sluder method. There are many and various knives used for dissection, various blunt dissectors and various scissors. There are numerous grasping forceps of all designs and snares of all descriptions, but the object of all is the same, namely, to dissect the tonsil loose from its bed and remove it intact with the snare.

There are also numerous modifications of the Sluder instrument, the technique, however, being the same except in the case of Beck's modification.

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All tonsils can be removed with more or less degree of satisfaction by the dissection and snare method. All tonsils cannot be removed with satisfaction by the Sluder method or any of its modifications. It is true, however, that many tonsils can be removed better by one method than the other, and it is up to the operator to make his choice. Some operators condemn the Sluder technique, usually because they have not given it sufficient trial. Those who use it are very enthusiastic in its results. There is no question but that a tonsil removed by the Sluder method is cleaner than one removed by dissection, and the tonsillar fossa is left in much better shape.

Practically all operators today use one or other of the above methods, or perhaps both.

Now comes Dr. J. B. H. Waring with an article in THE LARYNGOSCOPE, August, 1923, page 587, describing a new method of tonsil enucleation, called the "Waring Suction Tonsillectomy". The doctor has devised a set of glass tubes with an expanded bowl-shaped end which are really a modification of Hurd's tonsil tubes, used in the hyperemic treatment. His technique is as follows:

The tonsil tube is attached to a vacuum pump with about 25 pounds of negative pressure. A snare is thrown over the handle of the tube, the mouth of the bowl is applied to the tonsil, suction turned on, and after the tonsil is sucked up into the glass bowl, the snare is tightened down and the tonsil is thus enucleated. Dr. Waring claims that this method is far ahead of all others, in that it is practically bloodless, there is no danger of injuring the pillars, no danger of injuring the uvula or soft palate, and that the technique is easy to acquire even by a person who has had very little training in throat surgery; also that there is very little post-operative soreness or discomfort.

Having read the article and also having seen these tonsil instruments advertised in various journals, I decided to give the method a trial. I tried the method in 35 cases, all of them under a general anesthetic. I found the following difficulties:

After the tonsil had been sucked into the bowl, one could not see where the posterior pillar or uvula were. One could not tell for sure just what structures were included in the snare loop. The only way one could be sure that the uvula was not engaged in the snare was to grasp the uvula with a forceps so as to hold it out of the way. Contrary to the doctor's statements, there was not high visibility, but rather the contrary. As soon as the tonsil was sucked into the bowl, the contents of the tonsillar crypts were evacuated onto the surface of the tonsil and into the glass bowl. As soon as

the snare was tightened, the tonsil disengaged from the bowl and the tonsillar debris ran down into the throat. It was necessary then to grasp the tonsil with a forceps so that when it was finally cut loose, it would not fall into the throat. As a rule, the tonsil came out not clean, but with considerable muscle tissues from the constrictors of the pharynx attached to it. I think the reason for this was that the center of the tonsil is sucked up into the tube farther than the edges, carrying with it the muscle tissues to such an extent that the snare loop did not follow the capsule of the tonsil. It was difficult to keep the pillars of the tonsil from being sucked up into the bowl, and in some cases the Waring technique had to be abandoned and some other method resorted to. The tonsillar fossa bled just about as freely as if one had performed the Sluder operation. Considerable difficulty was encounterd in keeping track of the suction tube and the snare at the same time. Also these instruments took up a great deal of room in the patient's mouth.

In doing the second tonsil, it was found difficult to engage the tonsil in the bowl when the suction was turned on because of the presence of mucus and blood in the throat, which made the glass so slippery that the tonsil would not engage. However, by wiping the tonsil dry and the bowl dry, this was practically overcome.

Dr. Waring writes as follows:

"Advantages of the operation over existing techniques, are that it is so simple the operator of even limited experience can operate rapidly, safely and with uniformly good results; while the expert can do better, cleaner and more rapid enucleations by this method. Where rapidity is desirable, either tonsil may be enucleated in less than one-half a minute, and with good, clean fossae convalescence is rapid, the pillars intact and a most grateful patient with little complaint of post-operative sore throat.

High visibility is another strong feature of the operation: at all states of enucleation, the operation is under direct inspection of the operator. It is practically bloodless in all cases, so that no time is lost in attention to post-operative hemostasis. It is so rapid as to be practically shockless, even in the neurotic or aged, and time under general anesthetic markedly shortened. It renders tonsillectomy essentially a one-man job, and does not require the elaborate array of tonsil instruments sometimes seen at tonsil operations. The technic is simple, easily acquired, and does not require the prolonged training and experience necessary to attain competency with some of the existing tonsil operations. It is equally applicable to all types and

sizes of tonsils, but is of especial value in the deeply submerged and adherent tonsil, so difficult of attack under ordinary methods."

My findings in the few operations which I tried were quite in contrast to those that the doctor sets forth. He states that a person who has had scarcely any training can perform the operation easily and with dexterity. I have had the experience of over 6,000 tonsillectomies, and yet I could not perform his operation with any degree of satisfaction to myself or the patient. I am quite sure that the technique is harder to acquire than the Sluder technique, and feel that the beginner would be far safer to try to learn the dissection operation first. It is true that some cases came out with excellent results. These were cases where the anterior and posterior pillars were not attached to the tonsil, and where almost any operation would have been easy and where one could have enucleated the tonsil completely with a snare and no dissection. In some cases it was impossible to suck the tonsil into the bowl, no matter how much pressure was turned on.

Dr. J. E. Stansbury, who has been working with me for some years, tried the technique on fifteen cases, with about the same results that I have had. Another doctor told me he bought the instruments and tried them, but was afraid to tighten down on the snare because he could not tell what he had included in its grasp.

I do not wish by this paper to detract any credit from Dr. Waring and his new operation. Perhaps it is all my fault. Perhaps the doctor has been over-enthusiastic in his description of the simplicity of the operation. When Sluder first described his new technique, he made the statement that the operation was simple. Two years later he came out with another paper, saying that he had made no change in his technique, but wished to correct the statement that the operation was simple and say that it was indeed difficult. Perhaps the Waring operation has a certain trick about it which when once acquired makes it simple. I would be glad to hear what any of you who have tried this operation think about the method.

FOCAL INFECTION AND ARTHRITIS.*

Dr. Nathan P. Stauffer, Philadelphia.

At the Presbyterian Hospital, the Nose and Throat Department made an intensive study of 300 patients for focal infections, with special reference to arthritis. Our idea being to ascertain if the patients suffering with arthritis had any definite foci, and if so, where it was most frequently situated.

In the ear, nose and throat section we made repeated examinations by the pharyngoscope, the X-ray and transilluminations, and Escats position to definitely determine which tonsil or which sinus was affected. In a group of 200 arthritics I found that over two-thirds had diseased tonsils, and 25 per cent had sinusitis. By diseased tonsils, I mean tonsils which had caseous deposits protruding from the crypts, coupled with hypertrophy; or tonsils which had encysted abscesses and were markedly hyperemic.

This large number of diseased tonsils in arthritics is certainly a strange coincidence, or a valuable symptom. The question naturally arises, how are they related to the cause of arthritis? The next most common nose and throat lesion was sinusitis, over 25 per cent of the 200 had pus in their nares or post-nares. The striking part of this was the frequency of the posterior set of cells being involved, 45 occurring in the posterior ethmoids or sphenoids. Obstruction of the nose with various deviations of the septum, were almost as great, being just below 25 per cent.

This is important to the rhinologist, as sinusitis was found in so great a percentage of these arthritic cases. The teeth were only grossly involved in 10 per cent of the patients. By that I mean objectively decayed roots, unfilled cavities, pyorrhea, or calcareous deposits covering the teeth. The ears were so seldom involved, as to be almost nil as a factor. In this series, I have divided these patients into the acute and chronic arthritic cases, and the latter I have subdivided into those who can and cannot walk.

In 20 cases of acute rheumatism, I found 50 per cent had diseased tonsils, and 25 per cent had sinusitis. None of these had bad ears, or teeth.

In 49 cases unable to walk the percentage of tonsil trouble was even higher than the acute cases, for 75 per cent of them had diseased tonsils. In 4 of these cases, wonderful results were obtained.

*Read by invitation before the Philadelphia Laryngological Society, May 6, 1924.

For instance, Mr. K., bed-ridden for two years with painful arthritis, and had a small pair of diseased tonsils which were enucleated, and he immediately began to improve, and now four years later is walking around, an advocate of tonsillectomies; Mrs. B., a hopeless bed-ridden rheumatic, who used a dozen kerchiefs daily, had a radical Killian, a modified Killian and two Caldwell Luc operations performed before she was cured; and now three years later she is rejoicing in her ability to walk everywhere. These are apt to make one think all can be cured by these methods, but here comes the strange part, 20 of these 40 crippled patients, or 50 per cent, had had tonsillectomies without any appreciable improvement in their ability to walk, or use their hands and feet.

Of course these are all badly crippled patients, some of them unable to feed themselves, unable to walk, and some unable even to lift their bodies out of bed without assistance, so far advanced are they with ankylosis of the joints.

These deposits are so thick, as to make one lose hope even for any ultimate absorption, it was doubtful if anything would cure them. Their worst symptoms were intense pain, with sleeplessness. These complaints were alleviated, and in most cases cured by either the operation, or the treatment which Dr. Pemberton instituted, or the combination of operation and treatment. In another set of chronic patients, 97 who were able to walk, 45 had diseased tonsils, and 28 had sinusitis, and 25 per cent had deviated septums.

In these arthritics, their chief complaints were sore throats and postnasal dropping. In the earlier arthritic stages, the tonsils were acutely inflamed or hypertrophied; or the sinusitis patients' discharges were more mucoid, or of a muco-purulent character. In the more advanced stages of arthritis, I noticed the secretions were more purulent or the crusting was more pronounced. The patients in the advanced arthritic stages have a peculiar mousy odor to the breath, it is typical of an arthritic patient. It is not a stale breath, nor the breath of the alcoholic habitue. I have never noticed a breath like it except in arthritics.

Their mouths and throats are glazed, even though they do not have a high temperature, and I concluded it must be some change in the blood which makes the mucosa so dry. That we might properly judge the value of these arthritic findings, let us consider 100 cases of consecutive admissions to the hospital medical wards, and consult their diagnostic cards, the prevalence of nose and throat and mouth conditions in those patients. Of these 100, 60 per cent had infections of the nose and throat, 58 per cent had dental infections, and 34 per

cent were genito urinary infections. In the nose and throat infections, the largest number, 43, were diseased tonsils, and 30 had sinusitis. These findings were made in patients who were admitted complaining of heart and kidney conditions, etc. In these 100 patients, 50 per cent had a leucocytosis, and 25 per cent had an anemia.

The most frequent diseases being nephritis, or myocarditis, or a combination of the two. There were many other diseases, such as pneumonia, bronchitis, epilepsy, acute rheumatic fevers, heart block, perinephutic abscesses, hypethyroidosis, etc. These patients came to the hospital seeking relief for a wide variety of symptoms, the routine examinations brought to light the fact that those diseases were combined with or due to other ailments, some of which may have been the exciting cause of all their troubles.

It is again significant to find in these 100 cases, so many nose and throat complaints, 60 per cent having nasal and throat diseases. Therefore may we not say that the nasal mucosa, or the tonsils are many times the entrance for, or exciting cause of many of our common diseases? Possibly you may think they are only secondarily involved, and quite apart from the disabling disease. While I know that an excess of carbohydrates will increase or aggravate arthritis, I am of the opinion it is not the sole cause. I believe worry, exposure to cold, overwork plus lowered resistance, affords the opportunity for some change to take place in the body metabolism, whether it is a bacterial invasion from some foci of infection or some chemical change in the blood, these are problems which we are trying to solve. I know Dr. Pemberton has been unable to find bacteria in the joints, or fluids of these arthritis, but may that not be due to our technique? Koch could not find tubercle bacilli in a chicken's blood because its body temperature was 104°, but he could in a rat's blood, because its temperature is nearer the human.

In the tonsils examined microscopically and cultured the bacteriologist reports the great majority of tonsils as showing diffuse suppurative tonsillitis, and the most common bacteria being in their order: *1*, streptococcus—non-hemolyticus; *2*, streptococcus—hemolyticus; *3*, streptococcus—veridans; *4*, staphylococcus aureus; *5*, pneumococci; *6*, bacillus proteus.

Possibly these bacteria may secrete a poison which circulates in the blood or serum, even though the bacteria are not actually present in the tissues in sufficient numbers to be found when an arthritic joint is tapped.

In concluding I would emphasize, first, the large percentage of diseased tonsils in this series of cases, which causes a question as to

whether they may not be a deciding factor. Judging by the acute cases with the large number of tonsil diseases, the tonsillitis may be an early factor which escapes recognition. Possibly the bacteria entering and lodging in the tonsil, or passing through become active and virulent when bodily resistance becomes sufficiently lowered. Tubercular experiments on the common sewer rat were without result, until his bodily resistance had been lowered by excessive exercise, fatigue and a starvation diet, then he became an easy prey.

Second, in the more advanced chronic cases, I believe the bacteria have done their worst and the tonsil removal comes too late. Of course all arthritics do not have discoverable nose, throat or teeth or ear lesions; on the contrary, I can show you many tonsil and chronic sinusitis patients who never show any symptoms of arthritis.

Third, the large percentage of sinus disease cases in this series is another suspicious symptom. I think it is worthy of note and further study, especially the fact that many of them have an acute rhinorrhea, whenever they over-indulge in sugars, tobacco or overwork.

Fourth, the great rush to extract *all* teeth in these poor patients, I think should be discouraged. I have seen many of them with every tooth gone, unable to properly masticate and not a bit improved, old before their time, hopelessly discouraged. I think it a great mistake to remove all the teeth in these advanced arthritic cases, unless they are grossly diseased. Certainly the indiscriminate X-raying and extraction by many inexperienced operators is bound to bring the profession into disrepute unless it is promptly stopped.

Fifth, the indiscriminate tonsil removal is also bad, although their loss is not the hardship on the patient as the loss of all his teeth. In the earlier stages of arthritis, removal of the tonsils may be the decided factor in starting the patient on the road to recovery. In the later stages of arthritis, I question its advisability.

Sixth, the resulting shock of any operation in these hopelessly crippled arthritics is many times the straw which breaks the camel's back, their nervous system being overwhelmed by the surgical shock plus their added exhausting disease. If operation is indicated, it should be done early and after a period of building up.

The author is indebted to Drs. Pemberton, Talley, Sailer and Goodman for the privlege of seeing these patients, and making the collection of these case reports.

2015 Walnut Street.

SUTURING INSTRUMENT.

Dr. Edwin P. Bugbee, Detroit.

While serving as a house doctor in a hospital with a very active surgical service I had the opportunity to observe a great many tonsillectomies. These were done skillfully by many different operators. I noted that even the best operators occasionally encountered cases which bled considerably. This bleeding was difficult to stop and often required suturing. It is a difficult task to place a suture effectively in the back of a throat where the blood hides everything. I saw the need of an instrument which would do this quickly and easily. Figures 1 and 2 are two photographs of an instrument which I have made for this purpose.

Figure 1 shows the instrument assembled and ready for use. It consists of two main parts; a modified pair of hemostatic forceps and a special needle forceps as shown separated in Figure 2. Attached to one jaw of the hemostatic forceps is a bell crank operated by a push rod. The outer end of the bell crank carries a curved plunger. When the push rod is moved it causes this curved plunger to sweep through a similarly curved cylinder. In this way it forces out a small curved needle. This enters a similar cavity between the open jaws of the needle forceps. The needle forceps are attached to the hemostatic forceps in proper position to receive this needle. To explain this better I will describe the operation of the instrument.

A small full curved needle is threaded with fine cat gut or silk and then passed through a small eye on the end of the push rod. Next it is passed through an eye on the jaw of the hemostatic forceps and then passed eye-end first into the curved cylinder. The loose ends of the thread are pulled up into the hollow push rod by means of a small hook, similar to a crochet hook.

The needle forceps are next attached to the hemostatic forceps in the following manner. The jaws of the needle forceps are brought together by pulling on the trigger with the finger and pushing on the knob with the palm of the hand. Each

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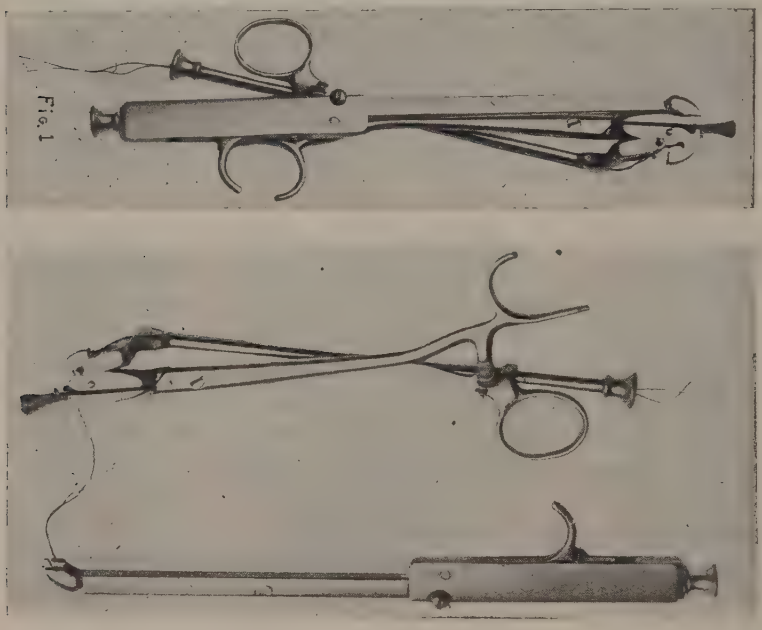
jaw is on the end of a rod which slides through the square hollow tube; so sliding the rods in this manner brings the jaws together.

The tips of the jaws are inserted into a cavity in the back of one of the jaws of the hemostatic forceps. When the knob and trigger are released a spring causes the rods to slide, expand the jaws and hold the jaw tips tightly attached to the hemostatic forceps.

The handle end of the needle forceps is also secured to the handle end of the hemostatic forceps. This is done by means



of a small projecting eye just behind the trigger, so not seen in the photographs. While the trigger is pulled and the knob pushed in, this eye is slipped over the straight end of the altered finger ring of the hemostatic forceps. The spring throws the trigger back and holds the projecting eye firmly in this position. The instrument is now ready for use as shown in Figure 1. Figure 1 shows the instrument grasping a piece of paper between the jaws of the hemostatic forceps as if prepared to sew through the paper.

The assembled instrument is held in the hand in the same manner as any hemostatic forceps.

In using the instrument the surgeon clamps the bleeding point with the jaws of the hemostatic forceps. Then he slips his thumb to the end of the push rod and pushes it quickly. This drives the needle through the tissues. The surgeon then pushes the knob with the palm of his hand and pulls the trigger without changing his grasp. This detaches the needle forceps and at the same time grasps the needle firmly. The needle forceps are withdrawn, pulling the thread through the tissues. This is the condition shown in Figure 2.

The needle holder is then set aside and the knot tied as desired in either of the following ways:

1. The hemostatic forceps may be used as a knot-tier. To do this it is released and partly withdrawn. The needle end of the thread is pulled out of the hole in the jaw of the hemostatic forceps and a half knot or sliding knot loosely tied. The needle and thread are then passed back through the hole in the jaw of the hemostatic forceps. The two ends of the thread are now grasped in the left hand and the hemostatic forceps grasped in the right hand. By pushing the forceps the knot is pushed down into place and tightened. The other half of the knot is then tied in a similar manner.

2. The other way of tying the knot is to remove the hemostatic forceps completely when the tissue is released. The knot is tied and pushed into place with the tips of the two index fingers without the aid of any instrument.

The chief advantages of this suturing instrument are the rapidity and ease with which sutures can be taken.

This instrument, previously threaded and made ready for use, enables the surgeon to complete a suture in a few seconds.

The needle, being positively guided into the jaws of the waiting needle forceps, does away with the difficulty of finding a little needle in a blood soaked operating field.

It is made of non-rusting material and steel nickel plated. It is very easily cleaned and is made in such a way as to be taken apart in a few seconds. In the case of the needle forceps this is done by simply removing the knob and the screw in the handle.

Such an instrument might be of great advantage in other inaccessible places besides the back of the throat.

In places where there is more room to work, several instruments might be used one after the other as hemostats and the sutures completed later when more convenient. By duplication of parts a similar suturing instrument can be made to sew more than one stitch at a time. Also by having a double instrument, carrying two needles, both ends of the suture could be sewed at the same time, thus making a mattress suture. By a slight modification of the jaws the knot could be tied by hand before detaching the hemostatic forceps when making a mattress suture.

281 Philip Avenue.

A METHOD FOR KEEPING AND CARRYING LOCAL ANESTHESIA FOR USE IN ANESTHETIZING THE DRUMHEAD.*

Dr. Philip S. Stout, Philadelphia, Pa.

For many years I have hoped that someone would devise a means by which local anesthesia, necessary for anesthetizing the drumhead, could be kept and carried so as always to be ready, of the proper strength, and sterile. If such a method has been devised I have not heard of it. Therefore, I have taken upon myself to bring to your attention a method which, I believe, will be satisfactory. I had this ready for the February meeting, but there was not room for it on the program at that meeting.

As you know, a sealed glass tube is one of the best methods of keeping and carrying any volatile or sterile substance that you desire to have ready when needed. With that thought in mind I have placed in a glass container a mixture of menthol, phenol, oil of cloves and alcohol, equal parts. I will hasten to add that I am aware of the fact that alcohol will, in some measure, interfere with the action of the phenol, but the combination has proven satisfactory in a number of cases. If you desire a still stronger product you can use cocain or anesthesin as one of the ingredients, although I do not think that is necessary in the majority of cases. These tubes are one-half filled

*Read before April, 1924, meeting of Philadelphia Laryngological Society.

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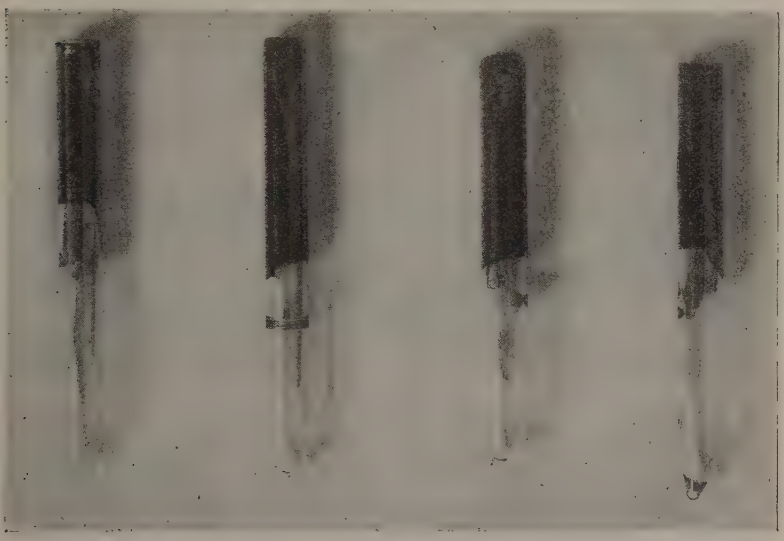
with this mixture and three or more coarse silk threads are placed lengthwise in this tube, and the tube sealed. A scratch is made around the middle of the tube so that it is easily broken when wanted for use. When you desire to use the product break the tube in half, draw out one of the strands of silk thread, place it in the ear well down against the drumhead and leave it there for at least four minutes and not longer than ten minutes. This silk thread is used in



place of absorbent cotton. If both ear drums are to be incised another strand is placed in the other ear. Additional strands are there if one is not sufficient. The knife blade can be inserted in the tube and a certain amount of sterilization can be obtained from contact with the sterilizing properties of the drugs contained therein.

I hope this method will prove satisfactory and will lessen one of the worries of our chosen specialty.

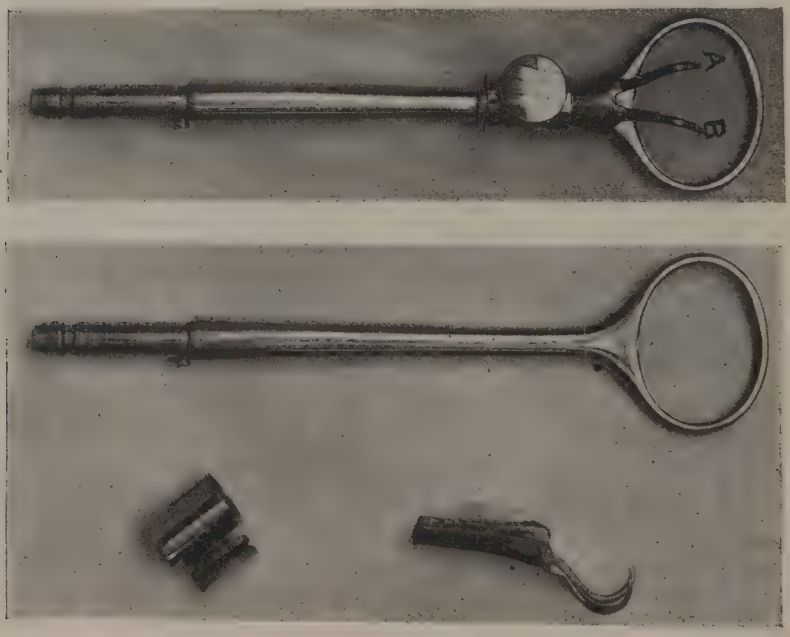
Walnut at Sixteenth Street.

A NEW TONSIL HOOK.

Dr. Noah Fox, Chicago, Ill.

The tonsil hook is an instrument designed for use with the Beck tonsillotome. It consists of two steel hooks A and B (see plate) mounted on an adjustable base, and so situated as to overhang the center of the window of the tonsillotome.

The Beck instrument is applied in the ordinary way, and the tonsil pushed out through the fenester, where it encounters the protrud-



ing hooks. As the snare comes down, the tonsil is of necessity, raised from its bed. This impinges the gland firmly on the hook, so that the operation may be completed without resorting to rescuing the tonsil as ordinarily, i. e., by tonsil forceps.

The hook is made to fit any type of Beck fenester, and can be quickly adjusted either to the left or right side. It is made entirely of steel, with no loose parts which might be lost during the operation.

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The advantages of using this hook consists in:

1. It steadies the Beck tonsillotome so that once properly applied there is no opportunity for the instrument to slide about.
2. It shortens the operation of tonsillectomy by doing away with the tonsil forceps.
3. It prevents any possibility of aspiration of the tonsil.

A BRONCHOSCOPIC FORCEPS FOR BALLS, MARBLES, BEADS AND OTHER HARD GLOBULAR OBJECTS.*

DR. GABRIEL TUCKER and DR. LOUIS H. CLERF, Philadelphia.

Many cases of foreign body in the bronchi and esophagus have come to the Bronchoscopic Clinics with a statement from the bronchoscopist referring the case, to the effect that no forceps would hold on the foreign body in the case sent. For this reason we deem it worth while to state that we have a variety of forceps some one or more of which will be found well adapted to hold any kind of foreign body. The great trouble with our predecessors in almost all cases is inadequate equipment. The absolute limitations of bronchoscopy imposed by the small lumen of the bronchi, about the size of a straw in a 6-months old infant, are such that success necessitates that instruments shall be suitable to the requirements of the particular case. For instance a forceps that will hold a bone securely will comminute a peanut kernel without permitting any tractive effort; a forceps that will grasp and hold a lead bullet will be absolutely useless in case of a jacketed bullet; the forceps that will securely hold the globular lead bullet will be utterly useless in case of a steel ball bearing or a toy marble of the same size.

A number of cases of marbles, beads, pebbles, ball bearing balls and similar objects in the bronchi and esophagus have come to the Clinic in a way that leads us to believe that the kind of forceps we use in these cases is unknown to most bronchoscopists. The characteristics of this class of bodies, exemplified by the ball bearing ball, are:

1 A hard surface on which serrations on a forceps jaw are useless because they will not indent. *2* A polished, glassy, slippery surface off which any ordinary forceps will slide. *3* A

*From the Bronchoscopic Clinics, Philadelphia, Pa.

globular shape which makes a declivity in every direction from any point of contact, so that ordinary forceps will inevitably slip off sidewise or proximally. 4 A globular shape that, with any ordinary forceps, even if placed precisely on the poles, makes a pivotal contact, which is always insecure because of swinging, which will dislodge the foreign body from the grasp.

The nearest approach to a satisfactory forceps among those in general use is our plain forceps, often called "forward grasp-

Fig. 1. Schematic cross section illustration of the problem of grasping a steel ball, glass bead or similar hard smooth-surfaced globular foreign body. A, flat-surfaced jaws on the forceps afford only pivotal contact even if grasped over the poles; usually they slip off sidewise so that the poles cannot be grasped. B, the forward grasping forceps, having a small cup in the face of the jaws affords a better grasp. C, ball forceps shown in Fig. 2. The ring-like jaws come well down over the poles, affording a good grasp.

Fig. 2. "Ball forceps" used at the Bronchoscopic Clinics for hard, smooth, glassy, surfaced, globular objects such as ball bearing balls, toy marbles, beads, etc. By going down over the poles to the "arctic" and "antarctic" circles respectively the jaws hold securely for any justifiable amount of tractive effort.

ing" forceps. These have in addition to the serrations, which are useless for hard, smooth, globular objects, a cup in the center of the face of each jaw.

The best forceps in our experience is that shown in the accompanying illustration. Its jaws are so shaped that all of their tendency is to slip on instead of off; and by going down over the poles to the "arctic" and "antarctic" circles they grasp even a ball bearing ball with the utmost security.

BOOK REVIEWS.

Handbuch der Neurologie des Ohres. Published by Prof. Dr. G. Alexander and Prof. Dr. O. Marburg, Vienna. Edited by Dr. H. Brunner, Vienna. Published in two volumes. Vol I contains 1186 pages, 409 illustrations in text, some colored, 2 colored and 10 black and white tables. Urban and Schwarzenberg, Berlin and Vienna, 1924. Half morocco binding. Price, 75 gold marks.

The past two decades have developed so much scientific activity and thought in the correlation of otology and neurology that the monumental work presented under the direction of such authorities as Alexander in otology and Marburg in neurology should be given a welcome and enthusiastic reception by every thoughtful otologist. The present handbuch is arranged in two volumes, the first on general and the second on special considerations in these fields. The first volume has been recently published and the second will follow shortly.

Alexander and Marburg have associated with them a group of eminent authorities and the volume before us presents a series of consecutive monographs contributed as follows:

I—NORMAL ANATOMY.

(a) Normal Anatomy, including the Descriptive and Topographical Anatomy of the Nerve Apparatus of the Ear, by G. Alexander.

(b) Microscopic Anatomy of the Nerve Apparatus of the Ear, by W. Kolmer.

(c) Embryology, Macroscopic and Microscopic Anatomy of the Nervus Cochlearis, Vestibularis and Cerebellum Cells, the Associated Tracts of the Central Nervous System, by O. Marburg.

II—PHYSIOLOGY AND PSYCHOLOGY.

(a) Physiology of the External and Middle Ear, by Br. Kisch.

(b) Physiology of the Internal Ear and the Central Nervous Tract, and also Sound Localization, by A. Kreidl.

(c) Tone Psychology, by W. Köhler.

(d) Experimental Physiology of the Vestibular Apparatus in Mammals and in Man, by R. Magnus and A. de Kleyn.

(e) Vertigo, by R. Leidler.

(f) Physiology of the Cerebellum, by J. P. Karplus.

III—PATHOLOGICAL ANATOMY.

(a) Pathological Anatomy, of the Nerve-Portion of the Ear, including Anatomical Anomolies; Distribution; The Eighth Nerve and Its Peripheral Ganglion; Pathological Anatomy of the Labyrinth, of the Cochlea, of the Bony Capsule, of the Perilymphatic Tissues and the Intracranial Complications Associated with Diseases of the Temporal Bone, by G. Alexander.

(b) General Pathology of the Central Nervous System, including the Causes and Gross Results of Disease, Changes in the Ganglion Cells, Alterations in the Nerve Fibers, Changes in the Neurogleia, by O. Marburg.

IV—CLINICAL METHODS OF FUNCTIONAL EXAMINATION.

(a) The Objective Determination of Organic Deafness by Means of Cochlear Reflexes, by A. Cemach.

(b) Acoustic Functional Tests, by H. Frey.

(c) General Symptomology in Diseases of the Vestibular Nerve and of Its Peripheral and Central Ramifications, by H. Brunner.

(d) Nystagmus, by J. Orm.

(e) X-Ray Diagnosis of Diseases of the Ear, by A. Schüller.

Each of these chapters is a completed monograph, written authoritatively, exhaustively, excellently illustrated and includes bibliography carried to the present period.

It would require an extensive digest to make a careful analysis of each monograph included in this important work; suffice it to say that the monographs have been prepared by authorities who have gained international recognition in their respective special research; that the entire publication, under the editorship of Dr. Hans Brunner, has been consistently co-ordinated and presented and that Volume One presents as formidable publication in otology as it has ever been our privilege to see.

M. A. G.

The Voice. A Scientific Study of Its Formation and Emission and Its Ailments, by Dr. J. Baratoux. With 160 Illustrations. Published by Les Grandes Editions Musicales, Ltd., Paris. 1925. Price, $2.50.

Baratous combines the unusual advantages of a laryngologist and master of the art of singing and presents in this treatise of twenty chapters in 240 pages a practical and interesting scientific study of the voice, its formation, its production and its ailments.

The chapters include: The Voice; Formation of Sound; A Novel Theory of Voice Function; Study of the Vowels and of the Consonants; Experimental Phonetics; Voice Technique; The Vocal Registers and Compass; Articulation; Experimental Voice Control; Auditorium Acoustics; Change of Voice; The Study of Singing; Misuse; Vocal Hygiene; Diseases of the Vocal Organs, and The Laryngologist versus the Singer.

There are many interesting thoughts expressed in these pages and there are also some rather unusual theories advocated. The English text is a rather poor translation of the original French; the illustrations are ample.

M. A. G.

Diseases of the Nose, Throat and Ear (Fifth Edition). A Manual of the Diseases of the Nose, Throat and Ear. By E. B. Gleason, M.D., LL.D., Professor of Otology, Medico-Chirurgical College Graduate School, University of Pennsylvania. Fifth Edition. Thoroughly Revised. 12mo of 660 pages with 212 illustrations. Philadelphia and London: W. B. Saunders Company, 1924. Cloth, $4.00 net.

The fifth edition of this little book is somewhat larger in size than the previous ones. This is due to the fact that the context of the book has been thoroughly revised and much new matter in the way of the newer facts and details pertaining to diagnosis and treatment has been added. Designed as it is to supply students and general practitioners with the essential facts of rhinology, laryngology and otology in as concise a form as possible, this book contains perhaps as much material as it is possible to put into any one small text-book.

The arrangement is very good and the author's treatment, especially of disease of the ear and their diagnosis and therapy, is exceptionally well done. That portion of the book dealing with the labyrinth and the various methods of testing its functional integrity is about as clear-cut and concise a statement of this usually somewhat confused part of otology as we have read. The only criticism we have to make of the book is that many of the illustrations are quite old and a more liberal sprinkling of cuts illustrative of technique and actual pathological conditions would have added much to the value of the publication.

A. M. A.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

COLLEGE OF PHYSICIANS.

May 6, 1924.

Local Infection and Arthritis. Dr. Nathan P. Stauffer.

(*Published in full in this issue.*)

DISCUSSION.

DR. RALPH PEMBERTON (by invitation): Dr. Pemberton said he was very glad to say a few words in regard to Dr. Stauffer's paper, as much of it had been based upon some of his cases at the Presbyterian Hospital. He was in entire sympathy with what Dr. Stauffer had said. Many cases of arthritis are caused by local infection. In the army, for instance, the largest number of patients with arthritis ever studied, more men got well as the result of various kinds of treatment for focal infection. His own patients all have the site of focal infection removed. He cited one case, a woman that he had been seeing with Dr. George Wood, who had had, for ten or fifteen years, various arthritic troubles. She had bad tonsils and poor teeth. When Dr. Pemberton first saw her it seemed to him that it would be unwise to remove the foci just then, so he treated her, and in about two weeks she was free of her symptoms. She then had a few teeth removed, and was sent back to Dr. Wood with the message that as she was only in her early forties, he saw no advantage in having such poor tonsils. Dr. Wood examined her and said he would not take the tonsils out. Something had happened to the tonsils since Dr. Pemberton had last seen them. So he wished to emphasize the fact that there are times when they operate on patients too hastily, and there is much harm done. He thought it unwise to proceed with surgical performances until a patient is in proper condition for it.

Demonstration of Aspirating Laryngoscope. Dr. Wm. F. Moore.

Dr. Moore demonstrated an aspirating laryngoscope, which was a small Jackson model, with an aspirating tube attached. This is made in two sizes, children's and adults'. In cases of pulmonary abscess, they found that the secretion came up in such quantities that it had to be helped out, so the idea was conceived to attach a spiral tube along the opening of the larynx. This can be shoved down into position.

A New Method of Carrying and Applying Local Anesthesia to the Ear Drum. Dr. Philip S. Stout.

(*Published in full in this issue.*)

Preliminary Report of Bacteriological Investigation in Acute Mastoid Infections. Dr. Matthew S. Ersner.

"A Comparative Study of Hearing Test Findings, with Various Instruments, Forks, Monochord, Whistles, Politzer's Acoumeter and the Ondometer." Dr. Douglas Macfarlan.

Tonsillectomy Under Nitrous-Oxide-Oxygen Anesthesia. Dr. Lewis Fisher.

Final Report and Pathological Findings of a Brain Abscess, Following Recovery of Pneumococcic Meningitis. Drs. Henry S. Wieder and Eugene A. Case.

Unerupted Teeth in the Adult. Several Case Reports With Roentgenograms. Dr. Harry A. Schatz.

Several striking cases have occurred in my practice in recent years in which unerupted impacted teeth proved the sole causative factor. It is my endeavor to give this subject prominence rather than to teach anything not hitherto known.

There are several explanations for failure of teeth to erupt naturally: *a*, malnutrition in childhood, whether or not the sequel to scarlet fever, syphilis, or any of the acute exanthematous diseases, is mentioned as one cause; *b*, eburnation of the jaw as a sequel to caries of the six-year molar is mentioned as a cause for failure of the third molar to erupt; *c*, premature extraction, or too tardy extraction, of deciduous teeth where indicated is another cause. Here timely gum lancing is of value. *d*, Another explanation is the retrogressive or degenerative changes in the development of the jaws incidental to civilization. *e*, Still another theory is that misplaced embryonal tissue (tooth-buds) explains inverted or displaced teeth with resultant impaction.

The tooth most frequently found impacted is the lower third molar. Why? Because of the difference in density of the lower jaw as compared with the upper. The upper canines occur impacted next in order of frequency.

The tonsil and adjacent pharynx can become affected as a result of the contusion and infection of the mucosa overlying an impacted lower third molar. Trismus and symptoms simulating peritonsillar abscess have been reported. Death from edema of the glottis is mentioned as a sequel. (Cameron.)

Earache is a common symptom of encroachment on the mandibular nerve by an impacted lower third molar. Also dentigerous cysts can develop from unerupted teeth.

The operation for removal of these teeth is safer and easier if done in early life.

Reference: A paper read by Dr. James R. Cameron before the Lehigh Valley Medical and Dental Societies at Bethlehem, Pa., in October, 1922.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

FURTHER REPORT ON SYNERGISTIC ANALGESIA AS EMPLOYED IN CASES ABOUT THE HEAD AND NECK.*

DR. JOSEPH C. BECK, DR. HARRY L. POLLOCK,
DR. FRANCIS L. LEDERER, Chicago, Ill.

Wonderful progress has been made in the last decade in the realm of anesthesia but we are still confronted with problems of the best type of anesthetic agent to use in each individual case. Rules can hardly be formulated to cover the entire field of surgery, as to what form of anesthesia to use, but after having worked up what seems to be a fair number of cases in our series we feel prepared to report again our experience with synergistic analgesia. From the work of the last few years, we have come to the conclusion that we can recommend to our colleagues a technique of great merit and although this report does not add a great deal to our original detailed work on this subject, we feel duty-bound to again bring it to fore, and especially since it was originally published in a non-oto-laryngological journal.

It is now a matter of over four years since we became interested in the use of synergistic analgesia as popularized by James T. Gwathmey, of New York City. Previous to this time the various forms of anesthetics were employed by us, such as ether, chloroform, ethyl

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*From the clinic of Drs. Beck, Pollock and Lederer, North Chicago Hospital. Reported before the Cleveland Academy of Medicine, Oto-Laryngologcal Section, 1922; Indianapolis Academy of Ophthalmology and Oto-Laryngology, Jan. 22, 1922; Chicago Laryngological Society Feb., 1922; Toronto Academy of Medicine (Oto-Laryngological Section), Mar. 10, 1924. Read before the Chicago Society of Anaesthetists, Nov. 27, 1923; American Bronchoscopic Society, St. Louis, May, 1924; and Third Annual Congress of Anaesthetists, Chicago, Nov. 27, 1923.

chlorid, nitrous oxid in its various combinations, intraspinal, morphin-scopolamin, as well as those for topical and hypodermic use. One of us (J. C. B.) some years ago, in a small series of cases, had given rectal anesthesia according to Gwathmey, without the morphin-magnesium sulphate combination, and had reported before the Chicago Laryngological Society, in 1915, certain objections, which consisted mainly in that the anesthesia was in most instances too profound and of too long a duration.

General Considerations: It is not the purpose of this paper to historically analyze the various types of anesthetics, nor to show the advantages and disadvantages of the various forms, but to stress the value of synergistic analgesia as one of the successful and useful types of anesthesia, particularly as it pertains to our special field. In our practice, this form of analgesia is rapidly becoming the most popular and one of the most practical forms of administering an anesthetic. Admittedly, it is an easy method, and although we would not be so dogmatic as to say that it is not in the least fraught with danger, we maintain that it has served us well and we no longer set a limit as to the number of cases we desire in our series.

Synergistic analgesia has been described by some authors as being a very simple mode of administration, and yet it has many intricacies into which the unwary may blunder. Naturally, we did not go into the study of such an anesthetic blindly, nor did we throw into the discard the other forms of local and general anesthesia which have to this day served us well. Therefore, while we were aware of the excellent results claimed for this anesthetic and knowing that it was not a task for the tyro or inexperienced anesthetist, we cautiously proceeded with its use.

Present-day researches in the realm of anesthesia have in the main a trend to find a more satisfactory method for inducing and maintaining analgesia and anesthesia. We would not, however, have it appear that our investigations with synergistic analgesia are evidence to the observer that such methods as local, general or any other forms are not satisfactory, but, on the contrary, our work was only to prove the efficacy of another useful method added to our armamentarium and to the art of anesthesia.

To us, synergistic analgesia came as a solution to many problems which had, heretofore, been overcome only by putting up with many difficulties or solving them in not the most convenient manner. In the majority of operative procedures about the head and neck, many difficulties present themselves, particularly due to the fact that the already small field has too many hands around it for the comfort of the patient and the convenience of the operator. In surgery of the

face and jaw it is of the utmost importance that the anesthetist's manipulations should not transgress the rigidly asceptic field which, for example, all plastic work demands. One might enumerate the many types of operative procedures where the danger of sepsis is increased by the presence of the anesthetist's hands even under the most favorable conditions, and where strict asepsis is attempted. We have nothing to say against the use of local infiltration in minor plastic procedures, but find the rectal-intramuscular method of value in other ways.

We find that in our special field entailing work about the respiratory tract (head, neck and chest), especially such as lying open the mouth, larynx, pharynx, esophagus, trachea and bronchi, there is a distinct advantage in this type of analgesia. Moreover, the synergistic type of analgesia is well employed in operative cases wherein the patient is suffering from respiratory embarrassment or in whom the amount of absorption must of necessity be limited, because of lung, heart or kidney lesions.

Local Anesthesia: Local anesthesia is the method of choice of practically all American rhinologists, perhaps on account of the simplicity of its administration and its possibly greater "safety". The latter term is perhaps a rather broad one to use with reference to any form of anesthesia unless its use is placed in the hands of the experienced. There can be no doubt that anesthesia, properly conducted, is distinctly a science, and is as intricate a part of the broad field of medicine as much as any other specialty. Therefore, we would say that the mortality rates are not always an indication of the toxic or harmful effects of the agent used; but in many instances are due to the lack of a thorough understanding of internal medicine, with special reference to the individual patient, and the lack of a fundamental education regarding the choice of anesthetics suitable to particular cases, and the only can we greatly increase our coefficient of safety. However, since fatalities do occur with undiminished regularity even in the hands of skilled anesthetists, the general condition of the patient has become an important factor in determining the risk of operative procedure.

Only recently have we been somewhat restricted even in the use of local anesthetics by the report of the committee of the American Medical Association for the study of toxic effects of local anesthetics. Their study of the deaths supposedly due to local anesthetics, led them to recommend that cocain should not be injected into the submucous tissue or subcutaneously and that cocain paste ("mud") should not be used as a preoperative measure; in fact, its use in the latter way was unreservedly condemned. However, they believed

that cocain could be applied safely in the following concentrations and total amounts: "Cocain in the mouth and epipharynx (preoperative), 5 per cent; in the nose, not over 10 per cent, and in total amounts of from 10 to 15 minims, containing from 1 to 1.5 grs.; in the eye, not over 5 per cent; in the larynx and bronchi, not over 20 per cent—preferably 10 per cent in two applications—and not over 15 minims total, containing from 1 to 1.5 grs. Procain should not be used in greater concentration than 1 per cent; apothesin, not greater than 2 per cent. Not more than 1.5 grains of apothesin should be injected for one patient. The use of butyn by injection appears inadvisable because of its relatively high toxicity; if injected at all, the concentration should not exceed 1 per cent nor the total dosage 1 gr. Butyn may be applied topically in a 2 per cent solution. Epinephrin serves a valuable purpose in causing a bloodless field and in delaying the absorption of the local anesthetics, especially procain, but the addition of epinephrin in amounts of 1 mg. or more to a solution of cocain often results in a greater degree of toxicity than from cocain alone, when rapid absorption takes place; hence, the use of larger doses of epinephrin with cocain is deemed unsafe, and epinephrin should not be used in greater concentration than 1:10,000 and of this not more than 10 minims with cocain. Somewhat larger total amounts of epinephrin may be used with solutions of procain, but not more than 1 mg. of epinephrin should be used, and even this dose may be unsafe in patients suffering with hyperthyroidism.

We have for the past four years advocated the use of cocain paste in our operative work on the nose, accessory sinuses, and throat and have not experienced one untoward effect. One of us (J. C. B.) shortly after Otto Freer reported on the merits of cocain paste some twelve years ago, went on record as being opposed to its use because of a collapse in a thirteen-year-old boy following the use of the paste for a submucous resection. However, it was pointed out that cocain and the age of the patient were not as safe as, it would seem, from those reported in the series by Dr. Freer. Since restoring the use of the paste again until stopped by the action of our colleagues, we had always adhered to the principles as outlined above. The paste was always topically applied and in limit doses, but never did we supplement it with any submucous or subcutaneous injection of any other anesthetic agent. In the majority of deaths investigated by the above mentioned committee, it will be noted that in practically every instance adjuncts were used in hypodermic form. In fact, three years ago we discontinued the use of adrenalin with the cocain, feeling that the concentrated solutions and mixtures of

the cocain were astringent enough to prevent anything but local action. The work of Ross and his co-workers proved definitely that the toxic effects of cocain were enhanced by adrenalin in combination with it. Then, too, we have not allowed cocain in any strength to be used hypodermically nor do we permit even the presence of the same in our operating room for fear of a mishap as a mistaken drug.

In regard to the weaker concentrations of cocain, such as a 5 per cent solution, we have used it almost routinely in office practice for treatment purposes and seldom have seen enough anesthetic action to attempt even as much manipulation as an antrum puncture. For operative work such a weak solution has not proved successful in our hands. However, with 20 per cent solutions, we have been able, in a measure, to carry on our operative work.

We are by no means of the opinion that local anesthetics must therefore be discontinued, but on the other hand, we are striving to find a more suitable type or method for the same. Only recently, from the work of C. Hirsch, of Stuttgart, we were given impetus to work with a new preparation which he calls "Tutocain", a hydrochloric salt of an amino-benzoyl-dimethylamino-methyl-butanol group. Hirsch claims for this product that it does not decompose by heat; can be used hypodermatically as well as topically; a higher threshold of anesthesia than any other agent; and contrary to cocain, non-poisonous. If this proves true, the question of local anesthetics would, at least to use, not appear so troublesome. However, we have it from authoritative information that this product is not obtainable in this country, so it remains for American investigators and chemists to produce an analogous product.

The point, which we would like to make in this connection, is not to take issue with the committee's report, for we wish in every way to co-operate with them until they, perhaps, will see the light, but we wish to emphasize the important position that the method of synergistic analgesia takes in our minds in relation to the situation we find ourselves in. In other words, it takes the place of the local method. In our first report we brought out the point that we did not intend this method to take the place of local anesthetics, but used it in many minor procedures, at first, to test its value. But we are now convinced of its value even as a substitute for local anesthetics should the situation not take on a brighter outlook.

Controlling Shock: If ever an ideal anesthetic presented itself, we have found it in synergistic analgesia. We all recognize psychic domination as a valuable adjunct in anesthesia. To impart to a patient, an enlivening sense of security, to allay, to some extent, the

phobias and delusions which are so imbued in his mind, is not the simplest task for the physician. The terror of the operating room of glaring white, the almost death-like tranquility and the observation of all things connected with the operation, are naturally not conducive to a restful mood. To anyone who has watched an operation under local anesthetic, with its stimulation of the cerebration, and its resultant loquacity and anxiety; or anyone who has witnessed anesthesia by the inhalation method with the wait for its induction and accompanied by the usual excitement stage, synergistic analgesia presents a pleasant surprise. The almost uncanny child-like slumber under the most trying circumstances in formidable operative procedures has been the source of many conjectures. To do a laryngectomy, considerable time is required and to have the patient at all times co-operative and responsive throughout this very major procedure, is to have an experience that thrills the onlooker almost as much as seeing the much "sawed-up" woman cut in two.

The important phase of the practice of anesthesia, which is constantly brought to bear, is the question of shock. To George W. Crile we owe much of what we know of the combined use of local analgesia with general anesthetics. Gwathmey states that by employing synergistic methods, a complete block against pain impulses, including the cutaneous nerves, is obtained and that, therefore, Crile's *anocithesia* may be considered obsolescent. We cannot fully agree with this, particularly with regard to the cutaneous sensitiveness, but we would venture a statement that synergistic analgesia is as near an approach to the anocithesia method as one can get with any other agent. All of us have had the experience of seeing the disastrous effect of terror and anxiety natural to the patient who contemplates a surgical operation on himself, even after all the effects of actual trauma are obviated.

A synergized patient receives his induction of analgesia gradually, amid the pleasant surroundings of his own room and Crile's important observations as regard to shock are in a measure strictly adhered to. Thus psychic shock is prevented by such a preparation. This principle is one that is not a great deal different from Crile's preparation in extreme, emotional thyroid cases, in which the patient is occasionally anesthetized in his own room, supposedly for therapeutic purposes, until he is finally prepared for operation.

Prof. Yandell Henderson, of Yale, is a research worker who has added much to our knowledge of surgical shock. He has advanced what is known as the acapnial theory of shock, in which he cites the lack of carbon dioxid, not only as inducing apnea, that is, cessation of activity of the respiratory center, but also in reducing other im-

portant functions so that the heart beats more quickly and the blood pressure falls. He, therefore, suggests that acapnia is the primary cause of shock. In synergistic analgesia acapnia is not a factor due to carbon dioxid over-ventilation for the blood is always fully oxygenated and consequently cyanosis has never been observed by us.

Then, too, synergistic methods are of great value to the busy surgeon who is pressed for time. To keep a patient waiting for an operation is almost torture, but delay is a negligible factor when patients are synergized. In fact, changes in our methods of procedure were made by accidentally noticing that those patients who were delayed and not brought in as per schedule were better prepared surgically than any of those who were brought to the operating room almost immediately after they had received their rectal ether-oil. Neither is there any need for haste on the part of the surgeon for fear of jeopardizing the patient's life, as the patient does not lose reserve vitality because of a lengthy procedure—under synergistic analgesia.

The Problem of Technic: While much has been contributed to the literature of synergistic analgesia during the last year or two, there does not seem to be any definite idea as to what is really meant by the term as regards a definite technic to be followed. One is led to believe that this is due to the gradual evolution of Gwathmey's work in this field. Some report cases of synergistic analgesia as giving only magnesium sulphate and morphin for preoperative preparation, while others use the rectal combination alone. In fact, we have observed and so have others, that the injections of morphin and magnesium sulphate, alone, are often sufficient to produce perfect analgesia, but this has not proved as constant in obtaining uniform results as has our present technic. Anesthetic efficiency has been obtained, however, in some cases even with the ether thus eliminated.

When Meltzer first experimented with the anesthetic properties of magnesium sulphate, he used it alone and administered it intravenously. It has no deleterious effect on any of the tissues or organs of the body. When used with morphin, it does not seem to have any toxic effect upon the respiratory center and seems to hold the morphin in contact with the tissues for a longer period and thus enhances its analgesic action. Magnesium sulphate has been known to affect the respiratory center, although we have not experienced this complication. However, if respiration does become embarrassed, some authors use calcium chlorid intravenously, while Gwathmey advises the uses of large amounts of normal salts intravenously,

and, on the basis of restimulation of the respiratory center, the rebreathing of the patient's own expired air.

In the consideration of the technic of synergistic analgesia, we are concerned with certain fundamentals in its administration. The dosage is guided mainly by the age, weight, general condition and mental makeup of the patient. However, the average dose for every fifty pounds of body weight is ⅛ gr. morphin sulphate combined with 2 c.c. of a fresh, sterile, C. P. magnesium sulphate solution (50 per cent), and 2.5 per cent novocain; equal parts of olive oil and ether (each 1 oz.), and 1 dr. of paraldehyde (U. S. P.). For the average individual weighing from 135 to 150 pounds, three doses are usually required. The morphin-magnesium sulphate combination is given intramuscularly, deep into the gluteal region or subcutaneously at one-half hour intervals between each injection. Then, one-half hour following the last hypodermic injection, the rectal administration is begun. Because of the discomfort that results from introducing fluids into the rectum, this part of the procedure should be done slowly and in small amounts, taking about twenty minutes to introduce the entire quantity.

It is a fallacy to assume that the entire amount given is immediately absorbed. As a matter of act, Gwathmey has estimated that about 2 ounces of ether are absorbed in an hour; and since each molecule of ether is combined with one of the oil, and only by evaporization is this combination broken, absorption must be slow. This point is significant for two reasons: *1*, because there results a steady, never deep, and constant anesthesia as vaporization occurs, regardless of the percentage of the mixture used; and *2*, that should it be deemed necessary, the bowel may be flushed with cold water and much of the ether recovered. The latter safeguard has been confirmed by flushing the bowel even four to five hours after the introduction of the ether. This possibility accounts for the perfect surgical analgesia persisting hours after the administration of the rectal combination.

Notwithstanding the slow absorption of the rectal mixture, it seems to be quickly eliminated, as the paraldehyde odor, particularly has been observed on the breath of the patient from four to six minutes after its introduction into the rectum. However, the patient inhales warm, moist air at all times so that when the ether is absorbed into the small blood vessels and carried through the liver and on to the heart, it can be easily eliminated by the lungs. At no time, in our series, has any irritation either to the gastro-intestinal tract or respiratory tract ever been noted. The patient's color remains good and the body temperature normal.

The necessity of a unit of measurement in anesthesia is self-evident and there is no doubt that any scheme not based on measurement of dosage is unscientific, crude and dangerous. However, there are certain other factors which influence this form of anesthesia, which in our experience must be considered in relation to dosage. For example, we have noted that in high strung, nervous individuals there seems to be such a tolerance for the drugs that an extra dose is often indicated. Also it has often been brought to our notice that nothing should be introduced into the rectum that cannot be reclaimed, but our experience with synergistic analgesia can be our only guide, and our knowledge of the fact that the rectal combination can be flushed out, if necessary, has given us confidence to carry on. This latter objection has so frequently been raised by our colleagues that from the above statements, they should be convinced that their viewpoint is wrong.

Summary of Technic and Dosage: For the average individual weighing from 135 to 150 pounds, the method of synergistic analgesia is as follows:

1. Prepare patient as for general anesthesia on the evening prior to operation, *i. e.*, enema and cleaning of operative field; the enema should be repeated on morning of operation. Give nothing by mouth after midnight.

2. Three to four hours prior to the time of operation administer intramuscularly deep into the gluteal region or subcutaneously, morphine sulphate grs. ⅛, dissolved in 2 c.c. of a sterile, fresh 50 per cent solution of magnesium sulphate (ampules preferred) together with 2.5 per cent novocain.

3. Great care should be taken in thoroughly cleansing the site of injection with benzin, iodin and alcohol and equal care should be given to the needle and syringe, which should be absolutely sterile.

4. These injections are repeated at half-hour intervals until three doses have been given.

5. A half hour after the last intramuscular injection has been given, administer slowly per rectum (over a twenty minute period) a solution of the following: ether, 3 oz.; olive oil, 3 oz.; paraldehyde, 2 dr.

6. Proper environment is then supplied by dimming the lights and by guarding against disturbance of the patient.

7. Transport the patient to the operating room with the least amount of disturbance possible.

We cannot agree with Gwathmey that this method does away with the necessity of the supervision of an expert anesthetist: in fact, we would encourage the employment of a professional anesthetist who

has a thorough knowledge of synergistic analgesia. Our student nurses have been taught the method of administration, but always under the supervision of a trained anesthetist. They are also instructed in watching for symptoms which would indicate an idiosyncrasy for any of the drugs and overdosage. The injections are given at such intervals that one can readily observe any untoward symptoms, should they occur.

We have not found occasion for interrupting our anesthesia in any of our cases, although we are constantly on the lookout for complications should they develop. To insure further safety as to dosage and to avoid any possible error in technic, it occurred to us that the morphin and magnesium sulphate, being a standard dose, could be put up in ampule form. One of us (F. L. L.), in personal communication with Dr. Charles Hooper, of the Metz Laboratories, has found them to be quite in accord with our views along these lines. They have been experimenting with magnesium sulphate put up in ampule form since 1921 and have prepared sterile, stable, solutions of magnesium sulphate and morphin and magnesium sulphate. These solutions have been tested out for their sterility and stability and while some of the ampules are now over a year old, the solutions are still water clear and have retained their full analgesic potency. They have been employed for all the purposes for which morphin would be employed in the hospital and results have been very satisfactory. Moreover, they have not given rise to painful tissue reactions at the site of the injection. This work in the Metz & Company laboratories has been carried out by Dr. Charles A. Hooper, who has been associating himself with Dr. Gwathmey in this synergistic research work.

Recently Drs. Hooper and Gwathmey gave a demonstration in New York City before the Regional Society of Associated Anesthetists of the United States and Canada (Oct. 22, 1924). Their laboratory demonstrations were to show the following:

1. The synergistic action of magnesium sulphate, novocain, morphin and ether.

2. Comparison of the effect of morphin and magnesium sulphate, morphin and novocain when administered intramuscularly.

3. The inhibitory effect of magnesium sulphate and novocain on the development of morphin tolerance.

The first two points were shown in albino rats and the third was demonstrated on dogs and cats. "In quantitative experiments with albino rats, it has been found that the intravenous administration of less than one-half the anesthetic dose of magnesium sulphate combined with approximately one-tenth the anesthetic dose of ether produces surgical anesthesia without increasing the toxicity of the com-

bination. The addition of 2.5 per cent novocain and 0.4 per cent morphin to a 50 per cent magnesium sulphate solution enhances the analgesic and anesthetic action of the magnesium sulphate at least 50 per cent when injected subcutaneously in albino rats. A gas chamber has been arranged in order to compare the synergistic action of magnesium sulphate and ether with magnesium sulphate, novocain, morphin and ether."

The ampules containg the combined magnesium sulphate-morphin-novocain solution have now been marketed and come under the Harrison Narcoti Law. In a 2 c.c. ampule, there is contained 50 per cent magnesium sulphate, C. P. (1 gm.), 2.5 per cent novocain (0.050 gm.) with ⅛ gr. of morphin (0.0081 gm.). The addition of the 2.5 per cent novocain to the combination is said by these workers to increase the analgesic potency of the solution approximately 25 per cent, and we are now employing these ampules, thus safeguarding and simplifying the technic.

The subcutaneous or intramuscular injections of a fatal or nearly fatal dose of morphin in the cat (20 mg. per kilo) has an exciting effect. The animal races about as if in extreme terror, with prominent eyes and widely dilated pupils, scratching and clawing wildly. Sometimes there are even convulsions. In all of the experiments that Meltzer and his collaborators carried out with the injection of magnesium sulphate, not a single instance was observed in which this salt produced an increase of excitation; on the contrary, any effect which it produced was invariably in the direction of a reduction of excitation or of its complete temporary or permanent abolition. With these facts in mind eight cats were injected intramuscularly, three with morphin alone (20 mg. per kilo) and five with the morphin dissolved in 50 per cent magnesium sulphate solution with 2.5 per cent novocain (800-1200 mg. $MgSo_4$ per kilo). The three control cats developed a violent mania. The animals that received the morphin dissolved in magnesium sulphate and novocain did not become violent and four of the animals soon became deeply anesthetized. The experiments show that magnesium sulphate is capable of reducing or completely inhibiting the symptoms of excitation which follow the injection of morphin alone in the cat.

The work of Gwathmey and Hooper can be summarized as follows: The synergistic action of magnesium sulphate and ether is described on a quantitative basis. Magnesium sulphate and ether act synergiestically in producing anesthesia when injected in combination into the saphenous vein of the albino rat as a water solution containing 6 per cent ether and 6 per cent magnesium sulphate. The synergism is of the potentiated type. The toxicity of magnesium

sulphate and ether is additive when injected in combination into the saphenous vein of the albino rat as a water solution containing 6 per cent ether and 6 per cent magnesium sulphate. The toxicity is a simple summation of the toxicities of the two compounds. The anesthetic dose of magnesium sulphate approaches the fatal dose very closely when injected into the saphenous vein of the albino rat as a 6 per cent water solution or when injected subcutaneously as a 50 per cent water solution. The margin of safety is slight. The anesthetic dose of ether represents approximately 40 per cent of the minimal lethal dose when injected into the saphenous vein of the albino rat as a 6 per cent water solution. The anesthetic dose of magnesium sulphate and ether represents approximately 50 per cent of the minimal lethal dose when injected as a water solution containing 6 per cent magnesium sulphate and 6 per cent ether. Concentrated magnesium sulphate solutions have little or no germicidal action. Contaminated solutions are not readily sterilized by boiling. Sterile 25 or 50 per cent water solutions of specially tested, chemically pure magnesium sulphate do not produce abscesses or severe tissue reactions when injected with asepsis subcutaneously or intramuscularly into the albino rat or the human being (2 c.c. injected at one site). The addition of 2.5 per cent novocain to a 50 per cent magnesium sulphate solution with morphin sulphate 0.4 per cent (2 c.c. contains 1/8 gr. morphin) increases the analgesic and anesthetic actions of the combination at least 25 per cent and also definitely prolongs the effect when injected subcutaneously or intravenously into the albino rat. In a limited number of experiments with dogs, the subcutaneous or intramuscular administration of morphin dissolped in 50 per cent magnesium sulphate solution with 2.5 per cent novocain (1/8 gr. morphine in 2 c.c.) has not been followed by salivation, vomiting or defecation. The simultaneous administration of magnesium sulphate 50 per cent solution with 2.5 per cent novocain (800-1200 mg. magnesium sulphate per kilo) reduces or completely inhibits the symptoms of excitation which follow the subcutaneous injection of a fatal or nearly fatal dose of morphin in the cat. Based on animal experiments the clinical dose of 2 c.c. 50 per cent magnesium sulphate solution administered subcutaneously or intramuscularly is at least 100 times removed from the fatal dose. Magnesium sulphate used alone in sufficient amount to produce anesthesia is the most dangerous anesthetic known. When used as a synergist with other drugs it may become one of the most valuable drugs in the pharmacopeia.

The Analgesic Operative State: The analgesic operative state may be compared to some of the forms of alcoholic intoxication, for

we have observed in different individuals various forms of "jaggs". These states were mainly those of hilarity and depression with intermediate forms of various gradations. The majority of patients were responsive to questioning and even volunteered sensible remarks themselves. If they were asleep they could be easily aroused and responded in accordance with the type of "jagg" they had.

Patients are brought to the operating room with the least manipulation possible and a suitable quiet environment is maintained. In our field we cannot particularly agree with what Keene says—"the ideal anesthetic is not one which will abolish pain without abolishing consciousness"—for in our opinion the anesthetic to be sought is that which permits the patient to co-operate and yet remain insensitive to pain. When the patient is quietly placed upon the cart and is brought to the operating room, he arrives there either quiet or sleeping; he is not apprehensive nor does any talk of his operation place him in an uncertain frame of mind.

In about 9 per cent of our cases the lifting of the patient has produced some nausea, but in very few instances has it occurred before the patient was brought to the operating room. In the latter cases we felt that the nausea followed the administration of the morphin. The explanation advanced for the very little nausea produced is that the magnesium sulphate prevents the late effect of morphin, among which is the possibility of nausea. There is certainly an advantage in the use of magnesium sulphate in combination with morphin, because it enhances the value of morphin from 50 to 100 per cent without getting the toxic effect of that much of the drug. For the latter contribution we are greatly indebted to Meltzer, Gwathmey, and the staff of the Presbyterian Hospital of New York City.

Accessory Anesthesia: In some of our cases accessory anesthesia had to be resorted to, particularly in cases where skin and, at times, mucous membrane and periosteum has to be incised. But it was noted, and quite strikingly so, that when accessory ether or infiltration was resorted to, it took but comparatively small amounts. Such insufficient narcosis occurred in about 14 per cent of our cases; and then by the addition of a little inhaled ether, or the injection of the skin or periosteum with 2 per cent apothesin, enabled the surgeon to complete the operation without a halt. It has also been noted that patients who were decidedly poor subjects for ether by the inhalation method because of alcoholism, etc., responded very well to synergistic analgesia, and even if accessory anesthesia had to be given, it took very small amounts to have the patient completely anesthetized.

Of patients asked, the day following the operation, what had transpired in the operating room, the majority answer that they remember nothing or else had a vague idea of what occurred. We have had patients who answered questions intelligently, and yet after the operation remembered nothing of what was said. Also in certain cases, when pain was seemingly complained of, patients stated later that they had no recollection of having suffered any distress. We would advise against the policy of trying to convince a patient that he has no pain when he complains of such, as we much prefer to supplement the analgesia with small amounts of local infiltration or ether vapor.

When the patients are returned to their rooms, after the completion of the operation, they are usually in quite a restful mood. Some individuals, who have exhibited a tendency toward the hilarious type of "jagg", occasionally continue to be quite talkative. To us, the postoperative analgesic state appears as a distinct advantage. Usually the patient, who has been operated on in the morning, remains more or less drowsy until late evening, and then is sufficiently quiet to go through the night without the need of an analgesia. There is no epigastric distress whatsoever, and in less than 0.5 per cent of our cases have we had to administer an added analgesic. If a postoperative analgesic had to be given, it was in small dosage and this had a more lasting effect than is usually noted. However, such an added analgesic was usually not required before midnight, as the operative analgesia was usually sufficient until that time.

Complications: There have been some instances when our patients were too deeply narcotized; that is, they did not respond as readily as they usually do. However, our coworkers have been instructed to stop all further medication in any instance where a patient goes to sleep before the entire amount has been given. In cases where the patients were found too deeply narcotized, they were returned to their rooms and left there until they had sufficiently recovered from their anesthetic to warrant our going on with the operation. In several instances the bowel was flushed out and the greater part of the rectal combination recovered. The symptoms never became especially alarming, but we always considered it a matter of safety and surgical precaution not to operate on an individual who was over-anesthetized.

Only in one case did we have what might be called a serious condition, and in this case the complication could not be directly attributed to the anesthetic. The incident occurred in operating on a young Italian, age 28 years, who came to us complaining of anosmia and stuffiness of the nose. Examination revealed both sides of the

nose filled with polypi and the X-ray showed a marked ethmoid involvement. The patient was brought to the operating room at 11 a. m. At the time of operation it was noted that the entire ethmoid labyrinth was soft and even the lamina papyracea was involved in the pathological process. The patient bled very freely after the complete exenteration of the ethmoids. Packing, which is not usually practiced in our clinic in this type of operation, had to be done and apparently all hemorrhage had ceased. Two hours later the nurse called our attention to the fact that the patient was bleeding quite profusely and, no doubt, had probably been bleeding since his return from the operating room, for upon examination we found much blood coming down postnasally. Physical examination of the lungs showed them to be partially filled, due to aspiration of the blood. Toward late afternoon bleeding became more profuse and could only be controlled by rather heroic measures. The patient passed away early the next morning, practically exanguinated, without having regained consciousness.

In this entire series, this case was the only one which showed a tendency to bleed, all the other cases evidencing less tendency to bleed than with general anesthesia. In reference to bleeding, it is important to note that a patient under synergistic analgesia is not so unconscious as to have his reflexes abolished, so that should blood trickle down into the pharynx or larynx, the patient will either expectorate it or will retain it until he remonstrates or else until the operator commands him to clear his throat. This is in favor of the synergistic analgesia operative state, and as far as the much talked of lung abscess complication of nose and throat surgery is concerned, this complication is either minimized, or the chances of its occurrence are almost nil. However, insofar as our statistics are concerned with lung abscess following head and neck operations under general anesthesia, the control of aspiration would not be the greatest advantage of this method, for in our experience we have had but one lung abscess case which complicated a sarcoma of the antrum.

There have been some cases in which an indurated painful area appeared at the site of injection and these have given us our only really marked difficulty. This complication occurred in seven cases in our series before we had the drugs in ampule form. These areas usually develop about the fifth or sixth day and while only comparatively few in number, they have given us some concern. They may be due to several factors: *1*, poor technic as to cleansing of parts and the sterilizing of the instruments; *2*, striking a vessel followed by the formation of a hematoma and the breaking down of same; *3*, the

possibility of the magnesium sulphate causing the induration when injected too superficially.

Types of Operations: To list in detail the cases undertaken in this series would be cumbersome and not particularly valuable for study, and so the data given herewith mainly concerns the types of operations in the series and certain conclusions arrived at. They are as follows:

Tonsils	278	Sinus (radical)	171
Mastoid	372	Frontal	39
Simple	229	Antrum	78
Radical	136	Ethmoid and Sphenoid	55
Sinus Thrombosis	7	Rhinoplasty	264
Larynx	160	Otoplasty	111
Laryngofissure	32	Facial plastics	153
Laryngectomy	12	Eye	39
Laryngoscopy	54	Nerves	42
Intralaryngeal	62	Jaw	27
Septums	108	Brain	18
Intranasal	127	Thyroids	22
		Miscellaneous	212

Other Details: The patients ranged from 5 to 74 years of age. The analgesia was employed in cases ranging from a marked thyrotoxicosis to known heart lesions and marked emaciations due to malignancy.

In those cases of bronchitis and asthma, in which general anesthesia was contra-indicated, synergistic analgesia was employed without any untoward effects.

Insufficient narcosis occurred in about 14 per cent of our cases and then by the addition of a small amount of accessory anesthesia, either by local infiltration or by drop ether, the necessary analgesia was induced. Suggestive methods are not encouraged for inducing sleep.

Nausea and vomiting occurred in about 9 per cent of the cases and usually not until the patient was being moved about.

No patient complained of any form of gastric distress such as often follows general anesthesia. Gas eructation was present in about 7 per cent of the cases.

In this series there were no kidney or bladder disturbances and urines were carefully checked at various intervals without pathological findings.

Acidosis was found present in a very small percentage of cases and never presented itself as a marked complication.

Many patients were given repeated analgesia at short intervals without noticing any tolerance for the drugs. One patient (reconstruction of a congenital absence of the ear) received the analgesia

seventeen times in the course of four years without noticing any untoward symptoms or drug tolerance.

Individuals, who were known to take a poor general anesthetic, as, for example, alcoholics, did very well and the amount of ether required was greatly reduced.

Such formidable procedures as laryngectomies and radical sinuses were carried out without any supplementary analgesia, with the patient at all times co-operative and responsive, and were not followed by any symptoms of shock.

Time, in regard to the duration of the operation, was a negligible factor, as the narcosis was smooth and of uniform depth for a number of hours.

Excessive secretions in the pharynx were not present unless ether was given by the drop method as an accessory anesthesia, and, therefore, no atropin was employed.

There was no excitement stage present during the induction of the analgesia.

At no time was there any cyanosis or loss of body heat, as patients could breathe freely moist, warm air.

The pulse and heart action were somewhat slower than usual, and the respiration also slower and more shallow. Little or no change was noted in the blood pressure.

Postoperative analgesia was required in less than 0.5 per cent of the cases and then only in small amounts.

A distinct advantage was found in having the patient neither frightened nor apprehensive, so that a great deal of psychic reaction as well as shock were eliminated.

Signs of irritation of the gastro-intestinal tract or respiratory tract were never present nor did the patients complain of any thing referrable to same.

Asepsis was greatly facilitated by absence of the ether mask and hands of the anesthetist.

The recovery from this analgesia was rapid; was not followed by lack of appetite; nor was there any tendency to mental depression.

This report has been made on the basis of our clinical experience, and while there are factors which may be interpreted as still challenging the absolute safety of synergistic analgesia, we feel that a series like ours should lend impetus to further study by ourselves as well as other groups, and then only can we hope to arrive at a more definite technic in applying this method. We have not stressed the subject of synergistic analgesia in children, but we have gone about employing the method in children rather cautiously and still continue

to do so. However, we hope that, through more experience, we shall be able to substitute some other drug for morphin in order to make it more applicable in the group of younger patients. We have attempted, in a small group of cases (children) to use ether according to Gwathmey's advice on the basis of giving an ounce of a 50 to 65 per cent solution of ether in oil for every twenty pounds of body weight. The results in some cases are quite satisfactory. Morphin, in small doses, and chloretone suppositories have, in some instances, produced excellent narcosis, although perhaps our lack of good results in children is due to our timidity in the use of morphin in the young.

A word as to the paraldehyde in combination with the ether may not be amiss here. It is a known fact that the paraldehyde in the mixture intensifies the action and insures complete relaxation without affecting the pulse rate or the respiration. However, we recommend that the amount be carefully checked and minimized to the extent of using only about ½ to 2 dr. to the average adult dose.

In connection with our first detailed report, we published, in the form of a preliminary report, the work of H. Ross and O. C. Pfeifer on animals. This work was done in the Department of Pharmacology, University of Illinois Medical College, under the guidance of Prof. Hugh McGuigan. Further work is being carried out with special reference to the ether-concentration of the blood and a more certain determination of the dosage required.

The conclusions which were drawn from these animal experiments, while authorized by the results of such experiments as we performed, were, nevertheless, not sufficiently established to be more than mere suggestions as to the relative effects of morphin and ether in ether-oil anesthesia. The following conclusions were reached: *1*, Anesthesia cannot be induced by the rectal method of the administration of ether-oil unless morphin is previously administered without requiring so large a dose as to produce intestinal irritation, diarrhea, colitis, and probably death. It does not seem possible that so large an amount of ether in so small an amount of the oily solvent can be crowded into the large intestine without producing a solitis of some degree; *2*, the dose of both morphin and ether is a variable factor since an individual idiosyncrasy toward both cannot be overlooked; *3*, an indirect proportion, within certain limits, exists between the dose of ether and morphin. Our safest results seem to suggest a high morphin dose with a correspondingly lowered ether dose; *4*, when anesthesia is produced by this method, it is an ideal one. We have observed the heart rate and respiration rate of animals for two and

three hours and found no change in either. There exists a rate of absorption and excretion, or rather, a ratio which, when once established, remains constant throughout.

In these above mentioned experiments the magnesium sulphate and paraldehyde were omitted and the fact was established that the degree of anesthesia produced has been dependent, not on the amount of ether used, but on the relative amounts of ether and morphin, and of these, morphin seems to play the major role. While we feel that there may be great discrepancies in comparative work on animals, it is only in this mode of experimentation that we can modify and change our mode of procedure without jeopardizing human life.

While we realize that in the question of anesthesia, this number is infinitesimally small, a start must be made somewhere to get to a series of such magnitude as to make logical statistics from, for example, a series of 50,000 to 100,000 cases. We wish to again call attention to the fact that this form of analgesia is not to be confused with any other of the colonic anesthesias as has frequently been done. Our reports as to the experimental and clinical phases of synergistic analgesia are not those of overly-enthusiastic investigators, for we fully realize the present shortcomings of our procedure, but we do hope that the work so far done will stimulate further investigation along the same lines.

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2551 North Clark Street.

SYNERGISTIC ANALGESIA IN HEAD SURGERY WITH SPECIAL REFERENCE TO NOVOCAIN, MAGNESIUM SULPHATE AND MORPHIN.*

Dr. James J. King, New York.

The value of magnesium sulphate and morphin as a synergist in general anesthesia was called to my attention first by Dr. Gwathmey in 1921. As a result, I immediately began clinical tests with the combination in conjunction with local anesthesia. After numerous clinical observations Gwathmey established the fact that morphin may be given in a 25 or 50 per cent solution of chemically pure magnesium sulphate instead of plain water and that in this combination the therapeutic value of the morphin is increased from 50 to 100 per cent.

At my suggestion, Dr. Hooper, Director of Experimental Medicine of the H. A. Metz Laboratories, carried out chemical and biological studies with magnesium sulphate. He prepared for me ampules containing a sterile solution of the pure chemical.

In 1923 in a paper, "Tonsillectomies in Adults Under Local Anesthesia", I made a summary of 1089 tonsillectomies on private patients. In 542 cases local anesthesia was employed. As a preliminary medication 1/8 grain of morphin dissolved in 2 c.c. sterile 25 per cent solution of magnesium sulphate was administered hypodermatically. The first injection was given one hour before operation and repeated one-half hour later. The tonsils were then infiltrated with 0.5 per cent novocain solution and enucleated. These magnesium sulphate and morphin injections produced an analgesic effect so that a very small amount of the local anesthetic was required. This was the first paper published in which magnesium sulphate and morphin were used as a synergist in novocain local anesthesia in head surgery.

About this time I was successful in bringing Dr. Gwathmey and Dr. Hooper together and in an extensive investigation they have established the synergism between magnesium sulphate, novocain and morphin, and also between magnesium sulphate and ether. Novocain acts synergistically with respect to the magnesium sul-

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phate, increasing greatly the analgesic and anesthetic potency of the solution when injected hypodermatically or intramuscularly without increasing the toxicity. The addition of the novocain to the magnesium sulphate-morphin combination increases the therapeutic efficiency of the solution at least 25 per cent and allays any irritation that may be caused by the magnesium sulphate. It also prevents the nausea and vomiting that frequently follow the use of simple morphin solutions. This solution may be successfully employed whenever morphin is indicated. The 2 c.c. ampule will abolish pain for three or four times as long as when morphin alone is given.

As a result of this work Dr. Hooper developed ampules containing magnesium sulphate with novocain, and magnesium sulphate with novocain and morphin. These ampules are prepared in an exact manner after a large amount of careful research and clinical work. They are prepared from specially tested, chemically pure products and freshly distilled water. The solutions are sterile and will not produce local reactions or sloughs when injected intramuscularly with asepsis.

With this work as a basis, I have used two or three intramuscular injections at one-half hour intervals of 2 c.c. sterile 50 per cent solution of magnesium sulphate combined with 2½ per cent novocain and ⅛ grain of morphin sulphate as a preliminary medication to local anesthesia. During the past year this preliminary has been used in approximately 100 tonsillectomies, in which 0.5 per cent novocain solution was infiltrated around the tonsils. In about 20 additional patients the tonsils have been removed without the aid of local infiltration or general anesthesia. In six patients one tonsil has been removed after injecting, in the usual way, 0.5 per cent novocain around one tonsil, and the other tonsil removed without the aid of local injections.

Two or three intramuscular injections of 2 c.c. sterile 50 per cent solution magnesium sulphate with 2½ per cent novocain and ⅛ grain of morphin at one-half hour intervals before local anesthesia is wholly satisfactory for nearly all patients. The addition of the novocain not only definitely increases and prolongs the analgesic effect of the magnesium sulphate-morphin combination, but it also entirely prevents the burning sensation complained of by many patients when ordinary hypertonic solutions of magnesium sulphate are injected.

The analgesia produced by the three intramuscular injections alone was sufficient and satisfactory in only about one-third of the

selected cases in which the tonsils were removed without the aid of local infiltration. One of these cases was a woman, age 70 years, who was quite feeble, thin and anemic. Her tonsils had been treated by the X-ray and were full of pus from a chronic infection. I was afraid of an extension of the infection by injecting around them. After two injections of the magnesium sulphate-novocain-morphin combination in the deltoid the tonsils were enucleated without pain. In some cases of peritonsillar abscess the tonsils have been enucleated without local infiltration around the tonsils.

I have used this synergistic analgesia in tonsillectomies only, but believe that it may be employed successfully in all ear, nose and throat operations where a general anesthetic is either contra-indicated or not desired. It seems especially indicated in conjunction with local anesthesia for mastoidectomies where the co-operation of the patient is not essential and where general anesthesia is contra-indicated.

While I have done tonsillectomies in selected patients (quinsies, aged and the septic) under its general analgesia, I believe its greatest usfulness will be found as a synergist and preliminary medication to local novocain anesthesia. In addition to its use as a preliminary medication for local anesthesia it also has great possibilities in the field of general analgesia when both general anesthesia and local injection of novocain are contra-indicated.

SUMMARY OF TECHNIC AND DOSAGE.

For the average individual weighing 130 to 150 pounds, three intramuscular injections are usually required.

1. The patient should not be allowed food after midnight when operating in the morning and not after 9 a. m. when the operation is scheduled for the afternoon.

2. Three hours before the operation is to take place administer intramuscularly deep into the thigh, deltoid or subscapular region 2 c.c. sterile 50 per cent solution of magnesium sulphate combined with 2½ per cent novocain and ⅛ grain morphin.

3. Thoroughly cleanse the site of injection with iodin and alcohol and be sure the needle and syringe are absolutely sterile.

4. The lights should then be dimmed, the patient kept quiet and the surrounding conditions should be conducive to relaxation.

5. Repeat the intramuscular injections at half-hour intervals until two or three doses have been administered, as may be required by the individual patient.

6. One hour or one hour and a half after the last injection the patient should be carried to the operating room on a stretcher and

transferred to the operation table; it is very important that the patient should not exercise even to the extent of walking to the operating room after he has received the preliminary medication.

7. The patients must be carefully observed and considerable judgment exercised in regard to the dosage for different persons. As the morphin is the most potent drug in the combination idiosyncrasies for morphin must be recognized and dosage given accordingly.

8. If toxic symptoms arise, treatment, as in morphin toxicity, must be instituted.

9. As the local anesthetic, 0.5 per cent novocain is employed.

40 East 41st Street.

UNSUSPECTED CASE OF OTITIC CEREBELLAR ABSCESS. OPERATION AND RECOVERY.

Dr. E. Trible Gatewood, Richmond, Va.

Patient consulted me last June, complaining of pain and discharge from left ear. He was a white man, age 30 years. His past history was of no special importance.

Present illness: Patient states he was seized with pain in the left ear six and a half months ago, which increased in severity for three days, at which time it began to discharge, giving him some relief.

A week later the intense pain returned and the discharge lessened in quantity. He then consulted his family physician, who punctured the drum. This gave him complete relief for a short time.

The ear continued to discharge freely but his pain returned and his doctor punctured the drum again, but he was never able to get entirely free from pain. His treatment then consisted of ear drops, aspirin—as high as 20 tablets a day—and occasional puncture of the drum. This state of affairs kept up over a period of six months, at which time he came under our observation.

Patient state he has lost about 20 pounds in weight. Has had no headache, vomiting or vertigo.

Examination showed a rather thin individual, who appeared to have a slightly fixed attitude of the head. Patient had a normal gait and there was no spontaneous nystagmus. The ear showed marked tenderness over the antral region only; percussion over the lateral wall of the head gave no pain whatever, nor was there any tender-

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ness or swelling over the mastoid cells proper. Deep pressure could be made over the tip or posterior region without the slightest discomfort. Inspection of the drum membrane showed a thick, soggy, bulging condition with a small perforation in its upper posterior half, discharging tenacious pus as fast as it was wiped away, showing it to be under pressure. His temperature was 99° and pulse 74. The case was regarded as a simple mastoiditis that was neglected, and patient advised to enter the hospital for an operation, which he immediately did.

A blood count showed luecocytes to be 5800, polys. 70, Hb. 85, urine negative.

Patient was operated upon the following day. The usual mastoid incision was made and an unusually small antrum opened, which was filled with pus under pressure; the mastoid bone was very dense and of the nonpneumatic type; just a few cells being found in the zygomatic region and they contained granulation tissue. Finding such a small antrum and so few infected cells, it was readily seen that there must be infection elsewhere to account for the quantity of pus that was seen coming from the auditory canal previously.

The dura of the middle fossa was exposed high up, but it looked normal in appearance and no exploratory stab wound was made in the temporo-sphenoidal lobe. There were no signs of an epidural abscess in this locality. The posterior fossa was then gone into through the mastoid bone just anterior to the knee of the lateral sinus, which was situated far posteriorly. The dura was exposed and a fistulous tract was found filled with granulations, leading into an abscess in the lateral hemisphere of the cerebellum. Judging from the use of the probe the abscess was about the size of a small orange. The dural perforation was enlarged on account of its minute opening with a bistoury which, was followed by an outflow of pus. The drainage consisted of a fenistrated rubber tube well anchored into the cavity. The usual dressing applied and tube shortened by degrees at subsequent change of dressings. Patient made a good recovery, never running a temperature over 100° and leaving the hospital in two weeks.

This case is of interest from the standpoint of the size of the lesion taken in conjunction with an absence of the most common symptoms of cerebellar abscess, *i. e.*, headache, vomiting, vertigo, slow pulse, nystagmus, incoordination, or visual disturbances.

The ear drum in all probability acted as a safety valve, thereby eliminating intra-cranial pressure.

Professional Building.

RADICAL MASTOIDECTOMY.*

Dr. E. B. Dench, New York.

I have been asked to make a few remarks upon the technique of the radical operation in chronic middle ear suppuration and your secretary in sending me the notice has written me that he desires to have me bring out the entire technique, including "the methods of holding chisels, curettes, and rongeurs".

It seems to me that in dealing with operations in special surgery too much stress has been laid upon just the points which your secretary has asked me to consider, while the operators themselves have not always had the clearest conception of the objects to be fulfilled in performing the operation. To attempt to tell one individual how to use a particular instrument has always seemed to me to be a mistake. It is wiser, I think, for him to have a distinct idea of what is to be accomplished and then to use for the purpose the instrument or instruments which his own experience has taught him that he uses most easily.

The object of a radical operation is to remove all diseased bone from the middle ear and the adjacent bony structures, and to leave a perfectly smooth cavity in the bone which will dermatize either from without inward or as the result of the application of a skin graft, applied either primarily or secondarily. In the formation of this cavity, it is essential in order to obtain a dry ear that due care be taken to obliterate the Eustachian tube, so that as a result of an inflammatory process within the nasopharynx the mucous membrane lining the tube may not proliferate and spread over the cavity at the expense of the epidermis which already lines it or is supposed to line it. It is necessary that there be no recesses in the operative cavity, so for this reason the posterior tympanic space and the inferior tympanic space must be completely obliterated, and the facial ridge must be lowered to the extreme limit of safety so that the antrum, tympanic vault and mastoid cells will constitute one large cavity, and that no small recesses be left in which secretion can accumulate.

The removal of bone in forming this cavity can be done with a variety of instruments. Personally, I presume that I use the gouge more than any of my colleagues. This is because, in my own hands,

*Presented at the Section on Otology, New York Academy of Medicine, Oct. 10, 1924.

I feel safer in using the gouge than some of the other instruments. Many work equally well, however, with the curette. In performing the operation my first object is to expose the horizontal semicircular canal and with this as a landmark to thoroughly remove all diseased bone, not hesitating to expose the dura or sinus if necessary. Particular attention must be paid as before stated to the complete obliteration of the posterior tympanic space and the hypotympanum. My own practice is to do the major part of this work with the gouge, finishing up with the curette. No recesses must be left, no matter to what extent the bony walls must be removed nor how closely we come to the facial nerve, as long as this structure is not wounded. For cleaning out the Eustachian tube I use a small sharp curette, always directing the cutting edge of the instrument upward and forward so as to avoid possible injury of the internal carotid artery.

After the cavity is formed, it is necessary to enlarge the meatus sufficiently to obtain perfect aeration of the cavity. Too large a meatus is unsightly, but in some cases, particularly in children, it is better to err on the side of making too large a meatus than to be content with one of insufficient size. No radical cavity will remain dry unless it is freely ventilated. My own method of enlarging the meatus is to cut a conchal flap, base upward, remove the cartilage from this and then bend it back on itself and suture it to the anterior flap with continuous chromic gut suture. To secure a dry cavity and particularly to preserve or improve the function of the organ, my own preference is to apply a primary skin graft at the time of the operation. This, I do in every case, unless at the time of operation, I find the ear very foul. The primary graft should never be employed in cases suffering from an acute exacerbation of the chronic condition. This, I consider hazardous. Exposed dura or sinus are not contraindications to the use of the primary graft. In fact, cases where the dura is exposed heal much more quickly than the cases where it is not exposed. In cases suffering from an acute exacerbation, in cases where we are not certain that the exenteration has been carried completely beyond diseased tissue and in cases of labyrinthine fistula, wounds of the labyrinth, sinus or dura, primary grafting is naturally contraindicated. These cases may be grafted secondarily in from one to three weeks after the operation.

The Tiersch graft should be moderate in size and my experience has been, that in some cases, too large a graft is difficult to manipulate. The graft is made to fit the cavity snugly, by first carefully placing it over the cavity, depressing it slightly in the center, seeing that the margins of the graft are in contact with the walls of the

cavity, and then exhausting the air from below the graft by means of a pipette, after the manner of Ballance. The pipette is carried along the anterior wall of the cavity until it reaches the tympanic orifice of the Eustachian tube. Suction then causes the graft to drop snugly into the cavity and to approximate itself to the walls by atmospheric pressure. The graft is then held in place by small pledgets of cotton. The deepest pledget, the one introduced over the Eustachian tube, is usually mounted upon a black silk suture so that it may be recognized. Usually from five to eight cotton pledgets are required to hold the graft in position. The cut meatal margin is also covered with the graft. Sometimes one graft is sufficient to line the entire cavity and to cover the cut meatal margin, sometimes two or even three grafts are overlapped. The best results are always obtained by covering the meatal margin with the graft; the posterior wound is then closed with Michel clips, and the pledgets are removed in from four to six days. The clips are taken out at the end of from 48 to 72 hours.

If the secondary graft is employed, usually the same technique is followed. The posterior wound is always opened, granulation tissue which has formed in the cavity is removed, so as to leave a thin firm bed of healthy granulations. Bleeding following the removal of these granulations is controlled by packing the cavity with 1 to 1000 adrenalin for a few moments. I may say also that adrenalin is used throughout the entire primary operation to obtain as bloodless a field as possible.

This, I think, describes the operation as completely as can be done in the time allotted to me. I have said nothing about any special technique in cutting the Tiersch graft. The great requisite is a sharp razor, the skin of the thigh, or from whatever part of the body from which the graft is taken must be stretched tightly, and this tension must be kept up as uniformly as possible throughout the entire process of cutting the graft. Bearing these two things in mind no one of average normal dexterity will have the least difficulty in securing a graft of sufficient size to line the cavity.

A word about the after treatment. The cotton pledgets are removed from the cavity, usually, between the fourth to sixth day. The subsequent treatment is very simple. My own plan is to cleanse the cavity by mopping it out with peroxid of hydrogen, full strength, and drying it with cotton pledgets and subsequently dusting boric acid powder over the walls of the cavity, for about ten days after the operation. Subsequently, after the cavity has been cleansed with peroxid, I mop the interior of the cavity thoroughly with about 60

per cent alcohol. It will be remembered, of course, that only the deeper layers of the graft take, and that the superficial layers will always exfoliate. The use of the peroxid and alcohol aids this exfoliation. Of course, there will be small areas over which the graft will not adhere. After cleansing the cavity in the manner described equal parts of boric acid and scarlet red will hasten dermatization. If during the process of exfoliation, the discharge becomes rather profuse the ear may be syringed once or twice daily with a normal salin solution. Too frequent irrigation, however, is not to be advocated. Dermatization is usually complete in from two to four weeks after the operation.

15 East Fifty-third Street.

TIME RELATIONS OF TUNING-FORK HEARING WITH THE FORK AT DIFFERENT LOCATIONS.

DR. DOUGLAS MACFARLAN, Philadelphia.

1. With a fork, C_{256} (vibrating with such intensity that it is heard by BC 90 seconds, by AC 180 seconds), the relation of hearing by BC over the mastoid antrum to hearing with the "butt" of the fork in the external auditory meatus is that in the latter position the hearing lasts 20 to 30 seconds longer.

2. The relation of BC (Weber, with the fork on the brow) to BC over the mastoid antrum was as follows: Testing fork,—C_{256} (n/ hearing,—BC 30″; AC 75″). BC Weber: BC antrum: 15: 25, 20:30, 23:29, 23:33 (these are four consecutive tests made on the same normal individual; the figures represent seconds).

3. The relation of the BC Weber on the brow, to BC by upper teeth conduction was as follows,—(fork C_{256}, BC 30, AC 75). BC Weber: BC upper teeth: 15:45, 20:45, 23:40, 23:45 (consecutive testings on the same individual; the figures are seconds).

4. Time hearing relations of,—BC Weber on brow: 20, 23, 23; BC on mastoid antrum: 30, 29, 33; BC on upper teeth: 45, 40, 45; BC and AC "butt" of fork in EAM: 60, 75, 75; AC at the EAM: 75, 75, 75. (Three testings on the same individual.)

The insertion of the "butt" of the fork in the external auditory meatus, holding it continually until its tone is gone, produces a dead-

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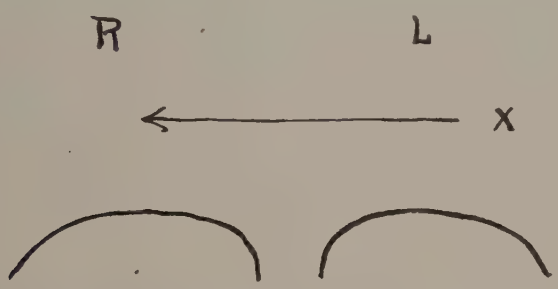
ening of hearing to AC when the fork is removed. This dullness is recovered from in 10-20 seconds, but it lasts long enough to upset a comparison between hearing with the fork in this location and with the fork at EAM. In other words, the fork must not be shifted from one position to another without making a fresh blow. Dean and Bunch have confirmed the finding of dullness of AC after wax has been removed.

It is noticed that the BC from the upper teeth is better than that from either the forehead or the antrum. This is singular because the mouth undoubtedly acts as a resonator, and thus though increasing the inital intensity of the sound, should exhaust it sooner.



In taking the Weber from the upper teeth it is impossible to see to what degree a deaf person can lateralize the sound, as can be done by shifting the "butt' of the fork on the brow. This valuable suggestion, as well as that of timing the Weber, comes from MacKenzie; it is quickly performed and adds greatly to the information given by the test.

The accompanying cut illustrates the author's method of graphically recording the Weber test. The arched lines represent the eyebrows. the cross marks the spot where BC-hearing is no longer lateralized, in short where the tone is heard equally in both ears; the arrow denotes the lateralizing direction.

1805 Chestnut Street.

STUDY OF STREPTOCOCCUS HEMOLYTICUS IN TONSILAR CRYPTS.*

Dr. Curtis C. Eves and Dr. W. R. Watson, Philadelphia.

Our attention was especially attracted to this subject during the examination of something over 450 children attending certain private schools in the suburbs of Philadelphia in the falls of 1922 and 1923. Besides an examination of the ear, nose and throat, a culture was taken from the tonsils of every child who still possessed them. These children, of an age ranging from 11 to 20 years, were individuals living in what might be termed the higher strata of social life and among the most approved hygienic surroundings. We make this statement with the view of directing attention to a curious phenomenon which occurs in further and later studies of cases obtained from a neighborhood where the question of hygiene is, to say the least, primitive, the findings of which we have tabulated below, together with the results of cultures obtained from the school children and a hundred cases from our private practice, as well as a series furnished by Dr. Russell Richardson.

In the group of cases we have referred to as living in poor hygienic surroundings we were careful to select only such tonsils as appeared to be perfectly healthy from which to take our cultures and, moreover, it may be stated that the throats of the school children already spoken of were in the majority of cases also lacking in acute pathology. Our idea in doing this was to prove beyond all doubt in our minds that the normal tonsil actually harbored the streptococcus hemolyticus, as a rule. But in the series of cases we report as furnished by Dr. Richardson, as well as in the hundred cases we cultured in our offices, the tonsils were palpably diseased. Our findings, as tabulated, are as follows:

Cultures taken from 170 students in "H" school, fall of 1922; 58 per cent were carriers of hemolytic streptococcus. Of this series 17 or 10 per cent were carriers of an almost pure culture. 44 or 25 per cent were carriers of a flora in which the hemolytic strep. predominated. 29 or 17 per cent were carriers of an equal number of colonies as of other micro-organisms. 9 or 5 per cent were carriers of hem. strep., but in which other organisms predominated.

Cultures taken from 100 students in "H" school, fall of 1923; 75 per cent were carriers of hemolytic streptococcus. Of this series

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31 or 31 per cent were carriers of an almost pure culture. 18 or 18 per cent were carriers of a flora in which the hem. strep. predominated. 17 or 17 per cent were carriers of an equal number of colonies as of other micro-organisms. 9 or 9 per cent were carriers of strep. hem., but in which other organisms predominated.

Cultures taken from 62 students in "G" school, fall of 1923; 84 per cent were carriers of hemolytic streptococcus. Of this series, 17 or 27 per cent were carriers of an almost pure culture. 19 or 30 per cent were carriers of a flora in which the hem. strep. predominated. 9 or 14 per cent were carriers of an equal number of colonies were of other micro-organisms. 7 or 11 per cent were carriers of strep. hem., but in which other organisms predominated.

Cultures taken from 100 patients in private practice referred for examination of tonsils to determine as to whether they might be the seat of focal infection. Of this number 70 per cent were carriers of hemolytic streptococcus to the following extent: 46 per cent contained large amounts of pure culture of hem. strep.; 20 per cent in moderate amounts with other organisms; 20 per cent carried large amounts of streptococcus viridens; only 10 per cent failed to carry either.

Careful cultures taken from the deep crypts of 75 dispensary adult patients since the spring of 1924 showing no pathology of the tonsils, with the following result: 13 patients or 17 per cent carried strep. hem. in large amounts; 3 patients or 4 per cent carried strep. hem. in small amounts; 11 patients or 14 per cent carried strep. viridens in moderate amounts.

Series of cases furnished by Dr. Richardson in which the tonsils were culture, together with a control culture taken from the mouth. Of this series there were 212 throats cultured, of which 39 were negative, 51 doubtful, and 122, or 57 per cent, were positive.

Thus, it may be seen, so far as our own researches are concerned, that the natural habitat of the streptococcus hemolyticus is the crypt of the tonsil. We are more than supported in this contention by other observers, who go so far as to say that the further one gets away from the crypt the scarcer this organism becomes. For instance, I. Pilot and D. J. Davis, in their article published in the *Journal of Infectious Diseases*, of April, 1919, state that "it is worthy of note that hemolytic streptococcus were found on tonsilar surfaces in a decidedly higher percentage (61 per cent) than in the pharynx (43 per cent)." Of interest, too, is the occurrence of hemolytic streptococcus in the crypts in 97 per cent as compared with 61 per cent on the tonsilar surface. Parenthetically it may be stated that

Nakamiera, in the Annals of Surgers, January, 1924, concludes that streptococci occur more commonly and in larger numbers than other bacteria in the parenchyma of extirpated tonsils. He states also that the incidence and relative numbers of hemolytic streptococcus increase with the coming of cold weather and the prevalence of tonsillitis and allied conditions.

Therefore, speaking from the viewpoint of the pharyngologist, the fact being fairly well established that the home of the hemolytic streptococcus is in the crypt of the tonsil, we have asked ourselves the following questions:

1. What is the significance of the incidence of this organism in the tonsil crypt?

2. What role does it play, if any, in either the prevention or cause of disease?

3. Is it, *per se,* of such a sinister character as it is pictured, or, in other words, has the medical profession properly gauged the potentiality of this organism for its supposedly excessive ill effects in certain conditions?

With reference to the first question we must frankly confess our ignorance in the subject. Hypothetically, we assume that the organism is found in purer culture and more often in the crypt because of its isolated position, away from such influences as would tend to weaken its growth, but what its significance is is still a mooted question, so far as we are concerned. It may, indeed, have no significance whatsoever, other than that certain organisms are found everywhere. And this fact we would accept without the trouble of any further research in the matter if it were not that the hemolytic streptococcus was so consistently the predominating organism in the majority of cases we have had under observation. Since this is so, and in quite a number an almost pure culture was returned, we have formed the opinion that its presence in the crypt is not purely coincidental. As a tentative explanation we can easily conceive of a theory in which the streptococcus hemolyticus was in its inception an ordinary streptococcus of no particular family, which, in the adaptation of itself to an environment of germicidal influences, such as acids and alkalis of the mouth, as well as tooth washed, gargling fluids, etc., sought a home less dangerous to itself, and in the evolution of its life cycle acquired a proteolytic character by which it was able to liquify the plug of mucus covering the mouths of the crypts, and thus eventually arrived at its final haven in the extremity thereof. And we know, of course, that through evolution certain organisms common enough in the beginning may finally become specialized

and take on an importance out of all proportion to their original form.

As to its role in the cause and prevention of disease, we seem to have fairly good evidence in the belief that the betahemolytic streptococcus plays a very beneficent part in the prevention of acute tonsillitis. Quoting from an article published by Felty and Bloomfield in the Johns Hopkins Hospital Bulletin, of November, 1923, they state that "in a previous paper it was pointed out that people who were tonsil carriers of the betahemolytic streptococcus failed almost uniformly to develop tonsillitis, whereas the incidence of the disease in those who were not carriers was over 40 per cent". In another paper published in the same bulletin they also state that "it has been possible very definitely to define susceptibility to tonsillitis. Carriers of betahemolytic streptococcus are practically immune. Non-carriers are highly susceptible."

We have been unable to find any confirmation of these rather radical statements by Felty and Bloomfield in the literature, but in order to corroborate in part the truth of their statements we have certainly noted so frequently in our own work in the hospitals and in our offices that certain tonsils which would impress one as being on the point of blooming into frank inflammation, seldom do so, and on inquiry the patients invariably deny ever having had tonsillitis, notwithstanding their tonsils possessed all the classical appearances of being sites of a focal infection. We have no doubt, therefore, that these latter forms of tonsils were strongly fortified by the presence of the beta type of hemolytic streptococcus.

This immunity for tonsillitis, in our opinion, is not through any inherent virtues donated by the betahemolytic streptococcus itself, but an acquired immunity through the tonsil receiving small doses of the emanation of an especially virulent type of the organism over long periods of time. This would make it appear that in our estimation the beta type of hemolytic streptococcus is not so benign as it would seem to be. We mean, of course, that in association with other more virulent micro-organisms which may invade the system in sufficient numbers, it is capable of turning against its host to become a very real menace and potent auxiliary in certain complications. This is best explained by citing from an article published by J. Martin Beattie in the *British Medical Journal*, of Nov. 12, 1921, as follows:

"It is significant that in the various infections a common starting point is the throat. One of the earliest symptoms is 'sore throat' and in such cases the hemolytic streptococcus can generally be demonstrated in large numbers, and this same organism is found later in

the complicating lesions. Taking an average of several observers in four common diseases, the prevalence of these hemolytic streptococcus is striking: Scarlet fever, 131 cases, 91 per cent; measles, 538 cases, 72 per cent; influenza, 340 cases, 70 per cent; lobar pneumonia, 151 cases, 50 per cent."

And again he states that "Pilot and others in 1918, during the pandemia of influenza, isolated hemolytic streptococcus from the lungs in 43 per cent of the cases. Cole and MacCallum state that the hemolytic streptococcus is the chief, if not the only cause of broncho-pneumonia following measles."

The general consensus of opinion seems to be, therefore, that the streptococcus hemolyticus, especially the beta type, when alone and confined to the tonsilar tissue, is of a benign and charitable character. In the presence of other pathogenic micro-organisms, however, it becomes the chief offender in many complications.

This partially but not completely answers our third and last question. If one were to ask indiscriminately all medical men that he met, "What do you think of the streptococcus hemolyticus?", almost invariably one would get a sombre shake of the head and the reply, "Very bad—very bad!", or, as one of our colleagues answered us, "When he is good, he is very, very good, but when he is bad he is horrid." Which reply, when it is analyzed, although somewhat frivolous, seems to approach the truth as nearly as one can get to it in the present light of our knowledge of the hemolytic streptococcus.

Incidentally, we wish to invite attention again to the discrepancy in the laboratory returns from the series of cases obtained from the Pennsylvania Hospital Dispensary, as compared with the cases from the private schools mentioned. As we have already intimated, the individuals composing these groups are living under entirely different hygienic conditions; those coming from the dispensary, as you already know, being members of the great unwashed proletariat, and the school children living in almost ideal surroundings.

Why this discrepancy exists we are not prepared to say. It would seem that where a collection of individuals are grouped together, such as school children, internes, nurses, etc., the percentage of carriers of the hemolytic streptococcus is more consistently found as compared with cultures taken from a scattered community, irrespective of their hygienic condition.

In summing up the evidence for or against the streptococcus hemolyticus, therefore, we regret that we have nothing new to offer except substantiation of a fact that has already been amply proven: that the home of this organism is in the crypt of the tonsil; that it

has a benign influence on the tonsil itself; that, theoretically, it may, in certain specialized physical conditions, be the etiological factor in some of the infectious diseases; and lastly, that it has been pretty well proven to be associated in many of the complications of all infectious diseases.

A word in conclusion to record a few other facts which came under our observation during the study of the cases as above cited:

In none of these series did we find any microscopic evidence which would enable us to determine the presence or absence of any one class of organism. Deeply congested bands along the margins of the anterior pillar and pharyngeal wall, as well as congested tonsilar tissue, may be found from infection of any of the more virulent organisms. Neither has it been possible to determine the character of the infecting organism by the amount, consistency, or color of the secretion expressed from the crypts. Until more definite evidences are produced by the laboratory one must determine the advisability of removing diseased tonsils upon the history of the patient, the appearance of the tonsil and surrounding tissue, the amount and character of the secretions expressed from the tonsil, and the condition of the cervical glands. In doubtful cases a culture taken from the deep crypts showing a predominance of any form of streptococcus, pneumococcus, etc., should influence one to advise removal.

247 S. Seventeenth Street.

EUSTACHIAN TUBAL CURETTAGE.*

Dr. Sidney Yankauer, New York.

When the Chairman of the Section asked me to say a few words about the curettage of the Eustachian tube my first impulse was to decline, for the reason that for the past few years my hospital work has been limited to rhinology, bronchoscopy, etc., and my ear work has been limited to what has been done in private practice. There are, however, three phases of this subject upon which I wish to speak. In preparing the patients, it has been my custom to irrigate the ear through the Eustachian tube with a catheter passed through the nose, using a pressure bottle. About three-fourths of the irrigating fluid will come back through the nose, but a good stream will come through the external auditory canal. This procedure is a very useful one. It cleans out much pus and mucus which could not be reached in any

*Presented at the Section on Otology, New York Academy of Medicine, Oct. 10, 1924.

other way. However, it is dangerous if the drum membrane is not open. It happens often that there are adhesions between the margin of the typanum and the inner tympanic wall; this bridge of tissue will sometimes extend along the floor or along the roof, making a fistulous tract. When these adhesions are cut, the irrigation is perfectly safe. Such irrigations are not only useful in preparation for operation but are also useful in the terminal stages of an acute otitis media. The secretions can be cleaned out and the recovery facilitated by this means.

The second, is the operation of ossiculectomy. The technique of this operation has been perfected, but the operation has been allowed to fall into disuse. The reason of the failure of ossiculectomy to cure the condition is the failure to include the closure of the tube in the technique. If this is done, a much larger percentage can be cured.

The third phase of the subject is one of the reasons why curettage of the tube sometimes fails to cause closure, and that is because of the neglect of the canal for the tensor typmpani muscle. This canal is genrally described as a bony canal, but the wall which separates the tenson from the tube is never a complete bony wall; not only are there dehiscences in the wall of the canal, but the inner end of the canal is open and the muscle fibres of the tensor tympani take their origin from the cartilaginous tube. Now, in the chronic suppuration when the malleus has been removed, either by disease or by operation, the mucous membrane covering the tensor tendon has been opened and the tensor muscle has rotted away, leaving the tensor canal open at both ends. The inner end of the tensor canal is exposed, so that even though the bony Eustachian tube is completely closed by granulation tissue there is still a communication between the pharynx and the middle ear through the tensor canal. This fact should be borne in mind, and in curetting the tube care should be taken to remove the bony wall between the tensor canal and the tube itself. That is not such a simple matter, for if we remember that just behind the tube lies the bony wall of the cochlea, and that the tensor canal which lies in relation to the tube lies posterior to it, when you are curetting in this region and the curette slips through, it makes you think of the cochlea and you are apt to get a shock. The curette should expose the entire part and make one cavity of the two canals. I do not know whether the surgeons who are doing many radical operations have given this matter the attention which it deserves. Perhaps it is only a small detail, but it is just as important in curetting the tube in the radical operation, as in curetting the tube through the intact bony canal.

BLINDNESS FROM TEETH, TONSILS AND ACCESSORY SINUSES.*

Dr. Leon E. White, Boston.

The word "blindness" at once suggests a deprivation so overwhelming that many would choose oblivion rather than existence without that wonderful gateway through which passes most of the impressions making life worth while, and without which the struggle for existence becomes so handicapped that not a few are compelled to seek charity to keep body and soul together. The hope that some of these victims would be benefited by a better understanding of the whys and wherefores of loss of vision from infections in the sinuses, teeth or tonsils has stimulated me to continue the investigation commenced twelve years ago. To this end various phases of the subject have been studied and papers read and published on the anatomical relations of the optic nerve, the literature, the diagnosis, the prognosis, the etiology, the pathology, treatment by aeration, etc., and more recently two papers, one "An Anatomical and X-ray Study of the Optic Canal", and the other "The Treatment of Optic Nerve Involvements as Determined by Optic Canal Radiographs". Within these various papers are detailed reports of fifty-nine cases.

Since learning how to measure the optic canals some of the views expressed in earlier papers have been modified and are here reconsidered. But first let me give you a few extracts from the literature which is voluminous and dates back to Beer in 1817. In 1886 Berger and Tyrman gave a brief review of the previously reported cases of blindness, some twenty-six in number, arising from sphenoidal disease, and noted that the bony wall separating the nerve from the sinus was frequently of only tissue paper thickness.

Onoidi in 1908 said: "Our observations have shown that the wall between the last ethmoid cell and the canalis opticus is nearly always as thin as tissue paper; dehiscences in the walls of the accessory cavities have been found, there the diseased mucosa may come into direct contact either with the dura mater or the optic nerve sheath."

Normally, according to Loeb, "the optic nerve may be described as passing externally from the chiasm along the roof or lateral wall of the sphenoid and in close relation with the ethmoid labyrinth *only* at the posterior external angle of the last cell".

From Schaeffer's book on "The Nose and Olfactory Organ" the following is quoted: "It is essential that the intimate anatomic rela-

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tionships which exist between the paranasal sinuses and the optic nerve and commissure be understood by ophthalmologists and rhinologists. It is established that disease of the paranasal sinuses may lead to an optic neuritis, even to blindness. Of the paranasal sinuses, the sphenoidal and the posterior ethmoidal especially concern us in this connection."

"After the optic nerve passes beyond the vicinity of the posterior ethmoidal cell it diverges more and more from the ethmoidal field and is no longer in intimate relationship with the other ethmoidal cells." This brief review suffices to show how thoroughly the relations of the optic nerve to the accessory sinuses has been worked out so that no one can question the fact that the sphenoids and posterior ethmoids are the only sinuses in intimate relation with the optic nerve and to reach the tissue adjacent to the nerve the direct and logical route would be through these structures and not through the entire ethmoidal labyrinth.

The diagnosis is naturally of major import. The symptoms in the ordinary cases of acute optic or retrobulbar neuritis are quite typical. Associated with the loss of vision there may be discomfort about the eye or lameness on moving it. Occasionally there is slight exophthalmos, this condition indicating an inflammatory process in the orbit. Pupillary changes and ptosis are found occasionally. There is frequently nyctalopia, a central scotoma for colors, enlargement of the blind spot and contraction of the fields. The patients generally say that things at first were blurry when looking straight ahead, but comparatively clear when viewed sideways. Changes in the fundus are of great diagnostic value, varying as they do from the normal to a commencing pallor in some cases, and in others to a marked redness and swelling about the nerve, with engorgement and tortuosity of the retinal veins. It is essential that these inflammatory swellings be differentiated from the edema due to intracranial pressure.

The anterior portion of the nose frequently appears normal. The one vital point to determine, in the nasal examination, is the size and position of the middle and superior turbinates. Do they block the ventilation of the posterior sinuses? Is there impaired aeration? It takes but a slight obstruction to interfere with the ventilation and the mistake is frequently made of expecting to discover marked changes; while on the other hand, whenever there is no blocking of the normal openings of the posterior sinuses, this region can, I believe, be ruled out as a causative factor in the neuritis.

The following is quoted from Stark, who expresses well the thought I wish to convey: "From a nasal standpoint we must not expect to find the common symptoms of sinus infection: pus, polypus,

history of nasal discharge, etc., as we are dealing with a closed sinus; otherwise we should not have pressure. . . . The deflected septum and middle turbinate tightly pressed against the lateral wall should always be suspected."

Over half the cases give a history of a recent coryza or a prior influenza, but in a few there is no history of infection. It is impossible to determine dental infection by a superficial examination of the teeth, many appearing normal even when abscessed, so that no examination is complete without a careful filming of every tooth. It is not always possible to determine the health or disease of a tonsil. Any enlarged cervical gland below the angle of the jaw is practically diagnostic. Congestion about the pillars or soft palate usually indicates infection. It is imperative that careful radiographs should be made of the accessory sinuses and optic canals. Whenever the sinuses are negative, the teeth and tonsils should be suspected. Tonsils at all suspicious, with teeth and sinuses negative, should be removed. The diagnosis many times must be made largely by exclusion. In all cases the patient should undergo a thorough physical and neurological examination. One should consider in turn blood, urine, hysteria, pellagra, lues, tobacco, alcohol, lead, arsenic, quinin, etc. While investigating time is a very important element and it is essential that needless delay be not encountered. Practically all necessary tests can be made within forty-eight hours. Pituitary disease, brain tumor and multiple sclerosis, while not usually producing such sudden loss of vision, must always be borne in mind. As a matter of routine the various cranial nerves and lobes of the brain are tested. Not a few cases with brain tumor have had various nasal operations before they were correctly diagnosed. Within the past year I have been guilty of removing tonsils and opening the posterior sinuses in two cases, but not until they had been thoroughly investigated at the Peter Bent Brigham Hospital and discharged on the assumption that there was no intracranial condition to account for the loss of vision. These cases, while not typical of accessory sinus blindness, had sufficient pathology in the nose and throat to warrant making an attempt to benefit their vision by this procedure. They were not benefited and both have since been operated upon for suprasella tumors. The knowledge derived from these patients has great assisted me in correctly diagnosing three recent cases with intracranial tumors. Careful investigation should prevent unnecessary operating. One should systematically go over each case before advising operation and convince himself that the eye condition in all probability originates from that which he proposes to open or remove, be it accessory sinuses, teeth or tonsils.

Etiology: The earlier writers considered the mere presence of pus in the sinuses the all sufficient explanation for the disturbance about the optic nerve, and while this may undoubtedly be the cause in some instances, it is by no means the usual or the only one. The nerve is ordinarily protected by the barrier thrown out by inflammatory processes so that it is rarely involved unless through some anatomical abnormality. In only a small percentage of my cases has pus been found. Hyperplasia has been emphasized by others as the chief cause, and while hyperplastic tissue may involve the posterior sinuses, it has seemed to me from my study of the sections and cases that it would better be considered a predisposing factor rather than the principal etiologic condition. Hyperplasia undoubtedly renders the sinuses more vulnerable. The etiology seemed to be explained in most of my cases either by the size and position of the middle and superior turbinates or from infection in the teeth or tonsils.

Pathology: I have undertaken the consideration of this subject under five heads, namely: *1* Direct extension; *2* toxemia from some infective process; *3* bacteremia or focal infection; *4* hyperplasia; *5* anaphylaxis.

1. By *direct extension* infections in the posterior sinuses probably extend by continuity of tissue to the optic nerve. When, however, there is an infection in a more remote sinus (an antrum for instance) it may become walled off before the nerve is reached. Should the infection persist, there may be forced into the system a certain amount of bacteria and toxins, which, in turn, can produce an optic neuritis.

2. *Toxemia.* It is conceded that retrobulbar and optic neuritis can be caused by alcohol, lead, tobacco, quinin, optochin, arsenic, lues, etc., so that reasoning by analogy there is little doubt but that toxins originating in the accessory sinuses, teeth or tonsils, or for that matter anywhere in the body, may have similar action on the optic nerve.

3. *Bacteremia:* It has been demonstrated by Billings that infectious microorganisms may be carried in the blood stream or by the lymph channel from the foci of infection in the teeth, tonsils and accessory sinuses to the terminal blood vessels in various regions of the body. He has shown how the inoculated blood vessels become more or less occluded by endothelial proliferation and leucocytic infiltration and that the bacteria escape through the vessel walls into adjacent tissue, so there would seem little doubt but that bacteria may also travel via the blood stream and lymph channels to the optic nerve.

4. *Hyperplasia:* As a predisposing factor hyperplasia is probably of considerable importance. It undoubtedly renders the accessory sinuses more vulnerable. Hyperplasia plus infection and direct extension to the optic nerve is probably of far greater consequence than the mere fact that the tissue has become hyperplastic.

5. *Anaphylaxis:* Stark has advanced the theory that there is a "sensitization of the tissues of both the sinus and the orbit by the bacterial proteins, producing an allergy resulting in a localized anaphylactic reaction each time the individual comes in contact with a fresh infection of the same bacteria in the nose, and possibly in other parts of the body. For that reason many of these cases give a history of attacks resembling hay-fever, or acute coryza, shortly previous to the eye trouble." While I have had a few cases presenting symptoms similar to those mentioned by Stark, it had not occurred to me that this would satisfactorily explain the pathology. It is, I believe, a valuable suggestion. There certainly seems to be a similarity between some of these eye conditions and certain anaphylactic reactions comparable to asthma and hay-fever. As sinus infections frequently cause asthma, it is conceivable that they might also produce engorgement about the optic nerve.

Prognosis. The prognosis depends largely upon the duration and extent of the loss of vision, the condition of the fundus, the virulence of the infection and the size of the optic canal.

Duration. The conclusions reached from an analysis of the cases were that unless there was improvement under treatment within a week there was danger of permanent impairment of vision, while in cases of more than two months' standing little could be expected except possibly checking the loss of vision by the removal of some definite focus of infection.

The amount of vision. It was also found that the demand for early operative interference in total loss of vision was more imperative than when the loss was but partial.

Condition of the fundus. When the nerve appears normal one might, with safety, delay operating much longer than where there is increasing engorgement, or commencing pallor.

The *virulence of the infection.* As in all the other types of infection, so in that producing optic neuritis, the microorganisms differ greatly in virulence. When the infection is of the virulent type, there is probably considerable exudate about the nerve or even within its sheath. The optic nerve, as you know, is really not a nerve but a part of the brain. It is easily destroyed and does not regenerate. Parsons says of it: "The so-called optic nerve, together with certain parts of the retina, constitutes a lobe of the brain, and has therefore

the characteristics of the central nervous system. Hence the nerve-fibres are devoid of a sheath of Schwann and the interstitial substance is neuroglia."

The *size of the optic canal.* That the osseous optic canals normally afford great protection to their neural contents cannot be doubted, but when these canals become narrowed and the enveloping sheath of the nerve, or the nerve itself, swollen, the unyielding walls may cause constriction sufficient to produce atrophy. Before mentioning the treatment, I wish to discuss the size and shape of the optic canal as it is a new subject and one to which I have devoted many hours within the past year. Piersol gives the diameter of the optic nerve as from 3 to 4 m.m. In a canal of 4 m.m., therefore, only a moderate swelling would cause a pressure so severe that degeneration of the nerve would rapidly ensue. The importance of filming the optic canal to determine adjacent pathology has been emphasized by van der Hoeve. This study was undertaken partially to substantiate his assertions but more especially to determine if there was any relationship between the size of the canal and the vulnerability of its contents. About two hundred skulls were examined at the Harvard Medical School and the results tabulated; the size, shape and position relative to pneumatization were noted. Roentgenograms were made of the optic canals in all available cases of optic nerve involvements, old and new, to determine the size and shape in the old cases and in the new ones to also ascertain any evidence of pathology. As a check, radiograms were made of twenty-five supposedly normal individuals. For this X-ray work I am indebted to Dr. A. S. Macmillan.

Up to the present, with the exception of pituitary cases, I have been able to find in the X-ray plates but little evidence of pathology adjacent to the optic canal. Possibly this is due to the type of infections largely responsible for the neuritis as these happened to be mostly from teeth and tonsils. I regret, moreover, that I cannot agree with van der Hoeve as to the importance of finding purulent sinusitis adjacent to the canal. It has been rarely possible to discover acute infections within the posterior sinus by the X-ray, while in the chronic cases which show pathology in the film, nature has walled off the infection from the nerve.

The important thing to determine is the size and shape of the optic canal. Adjacent pathology, while always sought, is not so easy to determine and many cases undoubtedly require surgical interference where it is not evident. The average diameter of the optic canal is given by Whitnall as from 5 to 6 m.m., while Wilbrand and Saenger give the average as high as 7 m.m. The canals were measured in 164 adult skulls, the average diameter being 5.17 m.m. The 5.5 and

6 m.m. canals were all round and only two had extensive pneumatization about them. Seven of the 164 canals of 5 m.m. were slightly oval.

Four were triangular and but twelve showed extensive pneumatization. Of the 4.5 m.m. canals (twenty in number) twelve were oval or flattened at the top and practically all were from two-thirds to three-quarters surrounded by pneumatic sinuses. The three canals of 4 m.m. were all oval or irregular. Two were nearly surrounded by pneumatized sinuses. The third was in a very dense skull and was probably due to hyperostosis.

The canals were usually found to be round irrespective of the way examined, *i. e.,* by holding them up to the light, by the fluoroscope, or the X-ray. The top posteriorly was occasionally flattened and in a few cases the canal appeared distinctly oval with the horizontal diameter usually the larger. Early in the measurements it became apparent that excessive pneumatization of the sphenoid adjacent to the canal was usually associated with diminution in its caliber. The thinness of the bone separating the inner wall of the optic canal from the sphenoid was noticeable in many specimens and in a few dehiscences were found, but as these might have resulted from cleaning the skulls, it was thought best not to tabulate them.

The size of the optic canal in infants and children is most instructive. The skulls of forty still-born infants were examined fluoroscopically. Of these it was possible to make out the canal in twenty. In two the canal was oval, and in the rest approximately round. In none was it less than 4½ m.m. in diameter.

Thus it would appear that the diameter of the optic canal at birth is nearly of adult size, but very short. There is a rather close analogy between it and the annulus tympanicus. The canal seems to reach adult size early in life judging by measurements obtained from a few children's skulls. Of six canals in skulls from children under three years, four were round and two slightly oval and all approximately 5 m.m. in diameter. The four canals from skulls seven to eight years old were all round and all of about 5 m.m. The canals did not appear in these few specimens to be in very intimate relationship to the pneumatic sinuses. Uniformity in the radiograms was obtained by having all the work done by one radiologist. To obtain the normal size and shape of optic canals twenty-five doctors, nurses and attendants at the infirmary were filmed. Five of the fifty canals in this normal series were slightly oval, *i. e.,* the vertical diameter was ½ m.m. shorter than the horizontal. The average diameter was 5.35 m.m. Twenty-five cases with optic nerve involvement were then filmed: twenty-six of these canals were oval. This makes 50 per cent oval

as against 10 per cent in the normal series. Several of these were filmed a second or third time in an endeavor to get correct positions. In ten there was 1 m.m. difference between the vertical and horizontal diameters. In the others about ½ m.m. In nineteen of these twenty-five the optic nerve was involved. The average diameter of the canals of the patients with optic nerve involvement was ⅔ m.m. less than the normal series.

The following is Dr. Macmillan's description of the correct position for filming the optic canal: The position in which a patient is placed for a radiograph of the optic canal is of extreme importance, as a slight variation in the position would so change the outline of the canal as to render its measurements worthless. Holding a dry skull in the hand and looking at the optic canal through the orbital cavity it is evident that the true shape and size can be seen only when the axis of the optic canal goes through the lower outer quadrant of the bony rim of the orbit. The optic canal in the living can be thrown into this area when the patient is lying face down with the malar bone, nose and lower jaw touching the plate, the central ray directed straight down. If the upper rim of the orbit is allowed to touch the plate, the optic canal will be thrown too high in the bony frame of the orbit and will be distorted. The diameter of an optic canal of 5 m.m. would be enlarged about ½ m.m. in the radiograph of a living subject.

In a study to determine what influence the size of the canal had on the best method of treatment, thirty-six cases with optic nerve involvement were analyzed.

SUMMARY OF THE FINDINGS IN 36 CASES OF OPTIC NERVE INVOLVEMENT.

In ten cases the vertical diameter was 4 m.m. or less and all were oval. Two of these were benefited but slightly, if at all, by operation. One unoperated case had complete optic atrophy. Another refused operation and was unimproved. Four cases improved greatly after the opening of the posterior sinuses but there remained marked temporal pallor. One required a tonsil operation and the remaining case, unoperated upon because of poor general health, has had frequent recurrences. These were, by far, the most serious cases in the series.

There were ten cases with canals approximately 4.5 m.m. in the vertical diameter and of these but three were oval. Four had the posterior sinuses opened and all recovered with practically normal vision. Five had teeth or tonsils removed and all these made good recovery. The remaining case recovered under local treatment. It

is interesting to note that in these 4.5 m.m. cases every one recovered with practically normal vision.

There were eleven cases with optic canals 5 m.m. in the vertical diameter and of these but two were slightly oval. In three chronic cases where the etiology was in doubt one showed marked improvement after removing the tonsils. A septum and tonsil operation on the second was followed by slight improvement. The third case, with progressive blindness, was temporarily improved in health and relieved of severe headaches, but later had a brain tumor removed. Four acute cases had the posterior sinuses opened; normal vision in three and but slight improvement in the fourth. The neuritis in this case was apparently not of nasal or dental origin. Three acute cases recovered under local treatment. The remaining case made a good recovery following the removal of tonsils and middle turbinate. Of the eight acute cases seven recovered with normal vision, and in the obscure eighth case tabes or multiple sclerosis is suspected.

There was one case with canals 5.5 m.m. in diameter. In one eye there was optic atrophy of many years' duration; the other eye of six weeks' standing, improved rapidly after the removal of abscessed teeth.

There were three cases with canals abnormally large, *i. e.*, 6 m.m. One of these, a case with progressive loss of vision, continued to fail after the sinuses were opened and the tonsils removed. The neuritis was later found to be due to a suprasella tumor. In the second case the vision returned to normal after the removal of the foci of infection in the mouth. The third case, untreated, had complete optic atrophy of two years' duration, probably from either abscessed teeth or an optic nerve tumor.

Further analysis of this data reveals that in the ten cases with canals of 4 m.m. or less, diseased teeth were extracted in one and in another the tonsils were removed.

Treatment. If future cases substantiate the results in those already studied, it will mean that whenever we are dealing with canals of 4 m.m. or less, the appropriate treatment in a case of severe optic nerve involvement will be the immediate ventilation of the posterior sinuses to prevent atrophy, unless some other definite focus can be found.

A 4.5 m.m. canal does not demand such radical treatment. Optic atrophy, while possible, is less to be feared. The posterior sinuses, unless blocked or evidently diseased, rarely need to be opened. Local medication may be given a reasonable trial. In canals of 5 m.m. or over the neuritis is probably not a direct extension from the sinuses and recovery from any acute attack may be expected either spon-

taneously or under local treatment. Later the focus should be sought and, if found, eliminated, be it in teeth, tonsils or sinuses, as the toxins from long continued infection can produce atrophy even in normal canals. Local treatment is usually a 10 per cent spray of argyrol and adrenalin about the middle turbinate, followed by hot irrigation or suction. When no definite explanation can be found for sudden and persistent loss of vision in a patient with a canal of 4 m.m. or less, the operation advocated as a therapeutic measure is the removal of the middle turbinate, a larger opening in the front wall of the sphenoid and the uncapping of the posterior ethmoid cell,—a simple and comparatively safe surgical procedure to one at all skilled in intranasal technic. The complete ethmoid exenteration, unless the cells are definitely infected, does not seem to me either a justifiable or necessary procedure.

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390 Commonwealth Avenue.

BRONCHOSCOPY IN THE TREATMENT OF ASTHMA—OBSERVATIONS ON TWENTY-ONE CASES.*

Dr. Robert M. Lukens, Philadelphia.

The object of this paper is to report the findings in a number of cases of asthma treated in the Bronchoscopic Clinic of the Chest Department of the Jefferson Hospital. The number of cases is far too small to justify any positive conclusions, but the results are suggestive of what may be done in certain types of asthma. It requires observation on a thousand cases to determine the value of any one treatment or procedure. This is particularly true of asthma for which, perhaps, more "cures" have been "discovered" and abandoned than in the case of any other disease.

It is important to remember that any disease so diverse in its etiology as asthma will not respond to any one method of treatment, and it is equally important to determine the treatment for each individual type of such a complex disease.

Great stress has been laid upon protein sensitization as an important cause of asthma and the treatment, with some degree of success, has been directed toward elimination of the exciting protein or to desensitize the patient by subcutaneous injections of an extract of the specific protein.

Various foci of infection undoubtedly have been the cause of certain cases and asthmatics have been cured or relieved by cleaning out chronic suppurative nasal sinuses or by the removal of polypi and correction of basic pathological changes in the structure of the nose. Carious teeth and infected dental alveoli have undoubtedly been at the bottom of some asthmatic attacks, although doubtless many a sound tooth has been sacrificed without relief. The focal infective type of asthmatic etiology is only one of many. Elimination of the source of infection, therefore, will or should benefit only a certain percentage of cases.

During recent years attention has been directed toward lung suppuration as an etiologic factor, and we believe that in the course of time certain types of so-called bronchial asthma will be treated by bronchoscopic methods as a regular procedure.

*Accepted thesis for membership in American Bronchoscopic Society.

because they are the most simple and direct means of reaching the basic lesion.

It is justifiable to perform diagnostic bronchoscopy upon almost all asthmatics, if done under strict surgical technic, and only after the preliminary examinations for prospective bronchoscopic patients, as laid down by Dr. Chevalier Jackson, have revealed no contraindication.

The tracheo-bronchial findings endoscopically may be secondary to some focus of suppuration elsewhere and it is obvious that cleansing of the tracheo-bronchial tree alone will not effect a cure in such cases. It is also obvious that bronchoscopic treatment will not effect cures in dyspnea of cardiac, renal, or gastrict origin; however some of these cases have been relieved to a certain extent by removal of viscid and tenaceous mucus from the trachea and bronchi. What part bronchoscopy will play in the neurotic cases, we are unprepared to say. Dr. Louis H. Clerf has had the experience of producing an apparent cure after a single passage of the bronchoscope without any other treatment. This he thinks was a case of neurotic origin.

Fifteen of the cases in this report had been under observation and treatment for varying lengths of time at the Asthma Clinic of the Department for Diseases of the Chest of the Jefferson Hospital under the direction of Dr. A. R. Vaughn, who referred them to the Bronchoscopic Clinic of that department because of the failure of these cases to respond to the routine and special procedures as carried out in asthma clinics.

The majority of these cases showed, bronchoscopically, good reasons why they were unbenefited. The predominating picture was that of suppurative tracheo-bronchitis. Whether this was the *cause* of the asthma or merely acted as an obstacle to producing a cure, which otherwise might have been effected, it is difficult to say. However, thorough cleansing of the tracheo-bronchial mucosa and the instillation of appropriate remedies greatly lengthened the periods between attacks after a few treatments.

The endoscopic findings in the cases treated in this clinic may be divided into four groups.

A. Those cases with chronic suppurative tracheo-bronchitis.
B. Those with chronic catarrhal tracheo-bronchitis.
C. Those with cyanotic mucosa without suppuration.
D. Those with urticarial patches.

Group A is composed of those cases in which there was an abundant muco-purulent material more or less tightly adherent

Case	Sex	Age	Group	Duration of Disease	Probable Cause	Frequency of attacks before bronchoscopic treatment	Previous special treatment
7	F	62	A	15 yrs.	Pan-sinusitis Arterioscelerosis	daily	General tonic
12	F	21	—	8 mo.	—	Every three weeks sometimes lasting a whole week	Submucous-resection. Tonsillectomy
13	M	59	A	2 yrs.	—	Daily	Stock vaccine
15	M	52	A	17 yrs.	Sinusitis Nasal polypi	Nearly every night Some attacks lasted several days	Vaccine Adrenalin Morphine Nasal Surgery
16	M	60	A	3 yrs.	Influenza	Nightly	Autogenous vaccines
17	M	36	A	32 yrs.	—	Increasing frequency	Submucous-resection. Tonsillectomy
18	M	36	C	9 yrs.	—	Irregular	Autogenous vaccine
19	M	64	B	12 yrs.	—	Several times a week	Autogenous vaccine
22	M	52	A	2 yrs. and 6 mo.	Nasal polypi Influenza	Several times a week	Polypectomy Autogenous vaccine
24	F	45	A	3 yrs.	—	Nightly	Autogenous vaccine
26	M	51	A	9 yrs.	—	One to several times a day	Adrenalin
33	F	31	D	5 yrs.	Goose feathers Orris root Rabbit fur	Irregular	Protein desensitisation
42	M	58	C	1 mo.	Cardio-renal	Several times a day	Symptomatic
43	M	44	A and C	3 yrs.	Pan-sinusitis nasal polypi	Daily	Polypectomy
45	F	64	A	4 yrs.	Influenza (?) goose feathers	Daily	Stock Vaccine Goose feather extract
46	M	54	C	6 yrs.	Repeated "colds"	Night and day	Adrenalin
55	M	40	A	6 yrs.	Cardiac	Irregular	General
60	M	47	D	Several years	—	Daily	"all kinds"
61	F	20	B	11 mo.	Tonsillitis	Nightly	Tonsillectomy
64	F	36	A	Several years	—	1 to 6 daily	Stock vaccine
65	F	29	A	7 yrs.	Followed a gynecologic operation	Frequent	—

Number of Bronchoscopies	Duration of bronchoscopic treatment	Medication per bronchoscope	Result of bronchoscopic treatment	Remarks
2	6 months apart	Aspiration and 20% argyrol	No change	
16	4 ½ months	Aspiration of right middle lobe abscess Asthma Solution	Improved	Post tonsillectomy abscess cured
16	1 year and 3 months	Aspiration and asthma solution	Improved	Triangular collapse of trachea during expiration
2	1 week	Aspiration and Asthma solution	Improved	
2	1 week	Aspiration and asthma solution	Improved	
10	1 year	Aspiration and asthma solution. Later 2% guaiacol in mineral oil	Improved	
5	2 months	Asthma solution	Improved	
2	3 weeks	Asthma solution	No change	Triangular collapse of trachea during expiration
15	1 year	Aspiration and asthma solution	Improved	
11	10 months	Aspiration and asthma solution	Improved	
4	4 weeks	Aspiration and asthma solution	No change	
2	2 weeks	Asthma solution	Improved	
2	2 weeks	Asthma solution	No change	
6	3 months	Aspiration and asthma solution	No change	
6	2 months	Aspiration and asthma solution	Improved	
6	2 months	Asthma solution	No change	
4	5 months	Aspiration and asthma solution	Improved	
4	3 months	10% silver nitrate to wheal and asthma solution	Improved	Marked bulging of party wall of trachea causing expiratory obstruction
6	2 months	Aspiration and Gomenol	Improved	
5	2 months	Aspiration and asthma solution	Improved	
2	1 week	Aspiration and Gomenol	No change	

to the mucosa of the trachea and bronchi. This material was found to extend from just below the larynx down the entire trachea and both main stem bronchi and which terminated usually at the orifices of the branch bronchi. The secretion of the branch bronchi was of a more mucoid character and was much less abundant.

This secretion presented several characteristics. In some cases the exudate seemed to be uniformly spread over the entire mucosa in a rather thick layer with, here and there, an elastic bridge stretching from side to side of the trachea and bronchi. In other cases the exudate was of a more lacey character and resembled finely teased out raw cotton spread out over the mucous membrane through which the mucosa appeared as under a veil. In the other cases the exudate appeared as fairly thick grayish-white placques, thickly adherent, forming islands on the inflamed mucosa. Upon removal by suction or swabbing, the underlying mucosa did not appear to be any more inflamed than the surrounding membrane, nor was ulceration or erosion of the underlying structure detected except in one case.

In Group B the predominating picture was one of a rather intense inflammation in which the mucosa was angry red and velvety in appearance. There was only a moderate amount of secretion, which was not purulent.

Group C comprises four cases. The murosa of the tracheo-bronchial tree showed distinct cyanosis, which was more apparent here than on the other mucous membranes, although the cyanosis was general. One of these cases was bronchoscoped during an attack and probably should belong to Group A because of the thin veil-like muco-purulent secretion covering the mucosa. In this case the cyanosis persisted and never entirely disappeared although the asthmatic attacks finally ceased.

Group D consisted of two cases. In one case the mucosa of the trachea and bronchi was normal in appearance excepting in the right stem bronchus just below the spur of the upper lobe bronchus, where there was a slightly raised, intensely red, rounded spot which extended half way around the bronchial wall. This was observed only once in this patient; it was never present in subsequent bronchoscopies. In the other case there were several inflammatory spots in the stem bronchi.

In three cases (two in Group B and one in Group C) a fairly severe but short attack of asthma was precipitated by the first bron-

choscopy. All three cases were recovered sufficiently to leave the hospital in less than two hours after the treatment.

One case had an associated bronchiectasis. This patient was a man 58 years of age. It is probable that the asthma was preceded by the bronchiectasis as the asthma dated back only nine months. The bronchiectasis was discovered by a routine Roentgen-ray examination by Dr. Willis F. Manges before bronchoscopy.

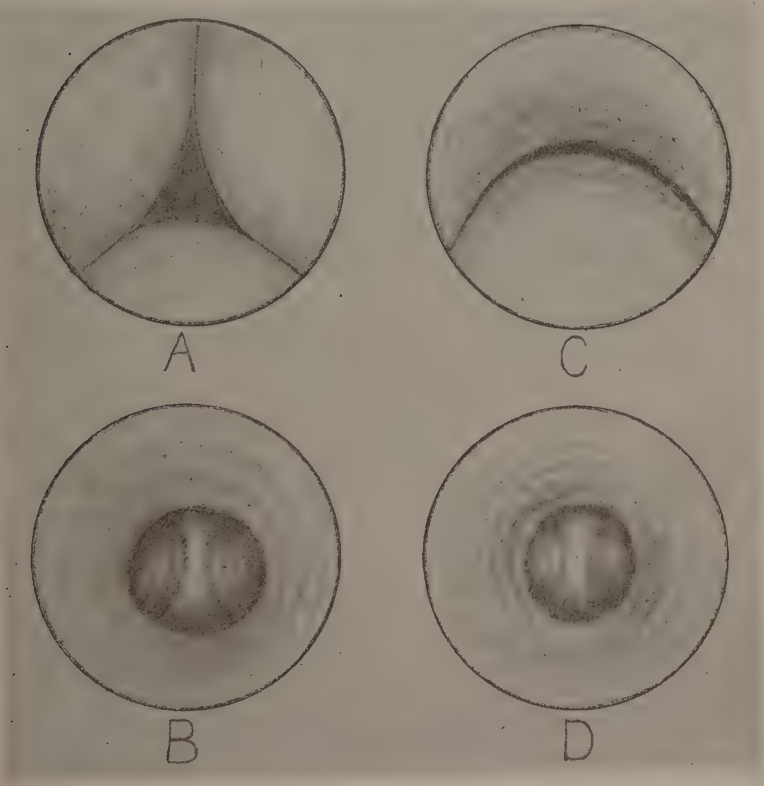
Another case was complicated by pulmonary abscess in the right lower lobe. In this case the pulmonary abscess followed a tonsillectomy performed to relieve the asthma. The asthma was not relieved by the tonsillectomy. The patient was referred to the Bronchoscopic Clinic chiefly to have the abscess drained, rather than with any thought of benefitting the asthma. The treatment in this case consisted in draining and irrigating the suppurative area, followed by instillation of "asthma solution". She was discharged after the sixteenth bronchoscopic treatment with the abscess cured and free from asthmatic attacks. She remained free from asthmatic attacks for about a year, when she had a recurrent attack.

Collapse of the Trachea: A peculiar condition hitherto undescribed has occurred in two of our cases of asthma and in one case in the care of Dr. Louis H. Clerf; namely a collapse of the trachea during expiration. On inspiration breathing was accomplished easily, but respiratory difficulty was extreme on expiration. The first patient in which this phenomenon was observed (Case No. 13) had stopped work eight months before admission to the Bronchoscopic Clinic and was unable to walk a city block without sitting down and resting. The first bronchoscopy was done during a severe attack. On introducing the bronchoscope, breathing ceased for several seconds and the bronchoscope was withdrawn. The same thing occurred on the second introduction a few minutes later, but, instead of withdrawing the bronchoscope, this time it was allowed to remain in the trachea until the spasm relaxed, opening up the trachea widely. On the next expiration the trachea collapsed again and presented the picture as illustrated in Fig. 1 (A). This phenomenon occurred with every breath until the bronchoscope was inserted almost to the carina, when the patient breathed freely as long as the tracheal walls were supported by the bronchoscope. The bronchi did not participate in this collapse. As shown by the illustration the collapse of the trachea did not resemble the narrowing of the lumen with the bulge of the posterior wall of the trachea as is seen in cough during bronchoscopy. This appeared to be an entirely different thing. In the asthmatic cases, the two lateral walls fell inward using the anterio-median line of

the trachea as a hinge and with the posterior wall forming an isosceles triangle with concave sides.

In a fourth case there was expiratory dyspnea caused by tracheal obstruction, but in this case the airway was crescentic (Fig 1, C) being formed by the posterior wall bulging into the lumen of the trachea and almost occluding it.

The reason for this three-sided collapse on expiration is obscure. It would be easy to explain if the collapse occurred on inspiration



as a result of obstruction in the glottic or subglottic region with negative air pressure in the trachea and would be due to a sudden creation of a partial vacuum, but in these three cases there was no obstruction and there was a positive air pressure in the trachea. Furthermore, it occurred during expiration.

The only explanation that I can offer is that these patients had emphysematous chests and that when the abdominal muscles were contracted forcibly to expel the air, the lungs were crowded up-

ward and the weakened walls of the trachea were overcome by the pressure and were forced inward. A sort of vicious circle was formed—a certain amount of expiratory dyspnea requiring the aid of the abdominal muscles, which in turn by acting too forcibly still further increased the dyspnea by indirectly collapsing the trachea. This may be the reason for marked dyspnea in certain cases of asthma.

Treatment: The treatment of this series of cases was of course both general and local, but it is not within the scope of this paper to discuss the general treatment. The bronchoscopic treatment consisted mainly in ridding the trachea and bronchi of the pus and abnormal secretions.

Morphine, gr. ¼, was given by hypodermic injection and cocain 10 per cent aqueous solution was locally applied to the laryngopharynx before bronchoscopy, except when the patient was having an attack of asthma. In order to get a correct impression of the endoscopic appearance of the trachea and bronchi during an asthmatic attack uninfluenced by drugs, either general or local, no morphine nor cocain was used when the patient came to the Bronchoscopic Clinic during an attack. There seemed to be no special difficulty in bronchoscoping these patients without an anesthetic. This may have been partially due to the patient being more or less narcotized by the attack or to having his attention taken up by his trouble much in the same manner as in the old story of putting a chip of wood under a balky horse's tongue to divert his attention; but we are more and more impressed with the needlessness of sedatives or local anesthetics for bronchoscopy. Usually after the first or second bronchoscopy morphine is rarely given in any case, and cocaine locally, used at first to reduce spasms of the larynx and so prevent trauma, is in most cases dispensed with after the patient learns to relax.

Appropriate sized Jackson aspirating bronchoscopes were used in all cases.

In the Group A cases the aspirating channel of the bronchoscope was frequently too small in caliber to remove the thick, tenacious material and in these cases the regular Jackson velvet tip aspirating tube was used.

At the diagnostic bronchoscopy specimens of bronchial and tracheal secretion are taken by swab and by collector for laboratory examination and for the preparation of autogenous vaccines. We are indebted to Dr. George R. Moffitt, of Harrisburg, who attended the Clinic regularly to make inocculations of culture media with the secretions and to take care of the specimens as soon as they

were obtained, and for making the autogenous vaccine used in this series of cases.

After thorough cleansing, 10 per cent solution of silver nitrate was used in the Group D cases to touch up the urticarial patches and in the Group B cases to swab over the most intensely inflamed areas. Two and one-half cubic centimeters of "asthma solution" (adrenalin hydrochloride, 1: 10,000 sol., m. xx; cocain hydrochloride, 10 per cent solution, mx; to normal salt solution oz. 1) was instilled into each lower lobe bronchus.

Other medications used by instillation in these cases were: Five to ten cubic centimeter doses of 1 per cent solution of menthol in mineral oil; 2 per cent guaiacol solution in mineral oil; and 20 per cent gomenol solution in mineral oil.

Those cases which responded to bronchoscopic treatment did equally well under any of the above solutions so that no conclusions could be drawn as to the relative superiority of any one solution in these cases of asthma. We believe that the cleansing and ridding of the trachea and bronchi of irritating secretions was the important factor in the treatment of the Group A cases.

Results of Treatment: Taken as a whole, the results of the bronchoscopic treatment in this group of cases were encouraging. While some of the cases aparently have been cured, it would be assuming too much to say more than that they have been improved up to the point where the asthmatic attacks have been reduced to infrequent seizures in most of the cases and in a few cases no attacks have occurred to the present writing, freedom from attacks extending over periods of many months. In the improved cases, the attacks have been shortened and are less severe than they were formerly; the ability to work has been increased; and general health and weight have been improved.

The Group A cases experienced great relief an hour or so after treatment and it is these patients who soon learn to visit the Bronchoscopic Clinic in time to prevent ensuing attacks of asthma. They report for bronchoscopic treatment at the onset of a feeling of the presence of secretion and of constriction in the chest, with productive cough. They are usually relieved for a period of several weeks following treatment. These periods of quiescence gradually increase in length; the bronchoscopic picture shows a decrease in the amount of secretion and a healthier mucosa. In two of the three cases of tracheal collapse, the collapse almost disappeared.

Conclusions: 1. Bronchoscopic drainage and treatment is a valuable aid in the treatment of those cases of asthma in which there is associated definite pathology of the trachea and bronchi.

2. No conclusions can be drawn as to the value of bronchoscopic treatment uncombined with general medical treatment as all of the cases of this series received general medical treatment including protein desensitization when indicated, and autogenous vaccine injections during the period of bronchoscopic treatment. But it is worthy of note that these measures produced no results until bronchoscopic treatment was added.

3. In this series of cases infection of the respiratory tract played an important part in defeating the cure of asthma by recognized medical procedures and was greatly overcome by bronchoscopic methods.

4. Collecting specimens of secretion from the trachea and bronchi without oral contamination can be accomplished only by bronchoscopy.

5. Bronchoscopy is a safe and valuable aid in diagnosis and treatment of asthma in suitable cases.

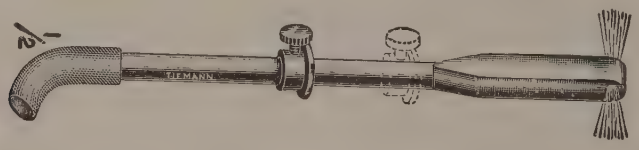
1631 Spruce Street.

A NEW TONSIL IRRIGATOR.

Dr. Sidney Yankauer, New York City.

It is my custom after tonsil operations to use irrigations of the throat with hot water. I have found this procedure to relieve the pain and to facilitate the healing more than any other single method. However, irrigation with an ordinary irrigating tip is not satisfactory as the tonsillar fossae are not thoroughly cleaned.

By this method and therefore I have devised this special irrigating tip in which the stream of irrigating fluid is discharged n the lateral



direction on both sides. A flange, the position of which can be adjusted with a set screw, is slipped over the shank and the apparatus fitted to the individual patient in such a way that when the flange rests against the upper teeth, the opening in the distal ends of the irrigator is just opposite the tonsillar fossae. Irrigation of the fossae in this way is much more effective than with the ordinary irrigating tip. It is made by Temann and Company, of New York.

Editor's Note: This mss received in The Laryngoscope Office and acceped for publication Jan. 13, 1925.

TWO CASES OF VINCENT'S ANGINA FOLLOWING TONSILLECTOMY.

Dr. G. M. Van Poole, Honolulu, T. H.

On Aug. 24, a tonsillectomy was performed upon Mrs. W., using 0.5 per cent novocain, prepared in glass ampules, as local anesthetic. Usual antiseptic precautionary measures taken and the operation was simple; the tonsils being large and easily removed.

The day following operation, the throat looked very well and she complained of little or no discomfort so she was allowed to leave the hospital.

On the third day, she complained of severe pain on left side when she tried to swallow and said that the blandest kind of food was very irritating. Upon examination I found the tissues simply melting away at the upper end of the wound. It was rather superficial and extended toward the uvula. I took a swab culture from that region and upon examination, it was found to contain Vincent's spirillum. The surface was covered with neo-salvarsan, which was removed by a competent nurse every two hours, and she was given neo-salvarsan intravenously. In spite of all treatment, the uvula was clipped off by the disease and the resulting scar left that side in a rather ugly condition from a cosmetic standpoint. At present, she experiences no difficulty in swallowing and the voice is natural.

The second case was a Mrs. D., who had a tonsillectomy performed on Dec. 17, 1924. She progressed very nicely until Dec. 20, 1924, when she complained of severe pain on the left side which was aggravated by any kind of food. Remembering my former experience, I at once took a swab culture and found the spirillum in abundance. In this case I did not use the neo-salvarsan, but applied locally 1 per cent brilliant green, 1 per cent crystal violet in 50 per cent alcohol. I am happy to state that under this local treatment the disease did not spread and at present, Dec. 29, she is practically well.

Young Building.

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THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

October 10, 1924

Dr. Lester Mead Hubby, Chairman.

a. **Simple Mastoidectomy.** Dr. Jacob L. Maybaum.
b. **Eustachian Tubal Curettage.** Dr. Sidney Yankauer.
c. **Modified Radical Mastoidectomy.** Dr. John R. Page.
d. **Radical Mastoidectomy.** Dr. Edward B. Dench.

DISCUSSION.

Dr. Blackwell said that those who recall the extremely painful postoperative dressings, the prolonged period of healing (usually eight to twelve weeks) and the depressed cicatrix which attended the performance of the simple mastoid operation some fifteen years ago are impressed with the striking advance which has been made in improving these distressing factors of convalescence in recent years. Some twelve years ago he had read a paper before the American Otological Society based on sixty-nine cases of simple mastoidectomy in which he had attempted to secure the postoperative result which is commonly obtained today by stressing the importance of thorough mastoidectomy; light packing; suturing the wound low down, combined with frequent dressings. At that time the paper was freely discussed and criticized as a great many members considered the measures advocated were too radical. Seven years later, however, in 1921 the author was asked to read a paper on the same subject before the same society, in which he made substantially the same recommendations, the value of which had become in the meantime more or less generally recognized and adopted and most of these had been mentioned by Dr. Maybaum in his paper.

As regards the treatment of chronic otorrhea, the author has for the past twelve years performed a number of modified radical operations with the object of not only conserving and improving the hearing but giving the patient a dry ear at the same time.

One of his early communications on this subject was read before the American Otological Society in 1916. The middle ear structures were always allowed to remain *in situ;* the posterior bony canal wall was taken down to the epitympanic ring, which was removed in its upper and outer quadrant or third; the mastoid cavity exenterated, forming one cavity with the external auditory canal as in a radical. Similarly a meatal flap cut: posterior wound sutured throughout and cavity dressed per new canal.

In the surgical treatment of chronic otorrhea there seems to be a general tendency to regard any operation having for its object the relief of the condition as a success or failure depending on whether or not the ear is subsequently dry. Comparatively little attention seems to be paid to the importance of obtaining a good hearing result, which so far this evening has not been referred to. In discussing O.M.P.C. the fault lies in nomenclature, for O.M.P.C. is not that generally speaking, but really mastoiditis, and an operation having for its object its relief should permanently drain and aerate the mastoid cavity as this is the only way by which we can surgically insure these patients against he future development of serious intracranial complications. Having satisfied these requirements by either a radical or performing a modified radical operation according to the technique as stated, after healing there should be no discharge. It sometimes happens that months later mucous will accumulate at the bottom of the wound from time to time; it has no

surgical significance as the discharge is slight in amount, intermittent, nonodorous, etc., and quickly responds to treatment. When the speaker performs a modified radical operation he prefers not to curette the tube as he believes that subsequently the hearing is much better with a patent Eustachian canal. Furthermore, the discharge from the tube can never amount to anything and readily lends itself to treatment with an exposed and aerated mastoid cavity.

He was very much interested in Dr. Page's paper and believed that the next great advance in mastoid surgery would lie in the major operative treatment of chronic otorrhea, which concerns itself not only with the cessation of the discharge but with the preservation and development to the highest possible degree the patient's hearing.

Dr. Wesley C. Bowers, referring to Dr. Maybaum's technique, said that he had nothing to add excepting that in children the sinus lies very superficially, especially at the tip, and he prefers to work upward rather than downward. He also emphasized the importance of removing the epitympanic cells: he liked to remove them until he could see the ossicles plainly, believing this had much to do with getting a dry ear in a few days, which is very important. His preference in draining the mastoid is to take an ordinary mastoid sponge, put some rubber dam about it and run it up near the antrum, leaving the tip of the sponge near the antrum, and allowing it to remain in for five or six days; at the end of this time it will come out, leaving a large opening. He never puts anything else in the cavity unless pus appears. He has been using this method for two or three years and found it very satisfactory. Manipulation of this drain causes no pain, and it leaves a nice, free opening.

Dr. Bowers said he was glad that Dr. Yankauer mentioned the tensor tympani canal. Up to three or four years ago, he himself, had been in the habit of curetting out the tube as far as he could go; in the last few years he had been throwing the two canals into one, and had been surprised at the great number of cells which surrounded the Eustachian tube, in many cases. Sometimes there is a cavity a quarter of an inch wide from above downward and an eighth of an inch in diameter. Since following this procedure, he had exposed the carotid artery a number of times but had never had any trouble; he had, also, had less trouble in getting dry ears in a radical mastoid.

With regard to the modified radical, it is a question of the location of the pathology and the amount of existing hearing. It is very seldom that he does a radical in which the hearing is better than one-quarter. Usually in these cases, there is a good deal of necrotic bone around the floor of the middle ear and around the tube; it is difficult to see how any amount of aeration could make this heal. Of course, if there is wonderful hearing and one is sure that the disease is limited to the mastoid there is no question but that the modified radical would be the operation of choice.

Dr. Dench had covered the question of the radical operation. The parts which are most neglected are the post-tympanic and hypo-tympanic spaces. The external meatus is convex with the apex pointing to the lumen of the canal and if this concavity is not removed there will be a cavity beyond which will act as a cesspool. The size of the cartilaginous meatus is very important. Dr. Bowers said he was in the habit of cutting a large meatus, especially in ward patients, so that they would be able to see all parts of the cavity and clean it out themselves. He agreed with Dr. Dench's opinion about the primary skin graft, which some men hesitate to use. In his experience, the results are more satisfactory in every way, and he had never seen any evil results except in the instances which Dr. Dench mentioned.

Dr. Kopetzky said that the discussion had been most interesting. Many points had been presented on which different opinions were held, and each man spoke from his own viewpoint. In his opinion the best way to handle the subject presented before such an audience was to state his own views and methods and give reasons why he differs from certain views expressed, although it does not necessarily follow that the opinions

criticized are wrong and his own right. The personal equation enters a great deal in the experience one has with a given technique.

In the simple mastoid, for instance, the technique which he had followed for a great while was never to remove the edematous mucous membrane lining the aditus and coming out toward the horizontal semicircular canal. If the simple operation is properly timed, this is found very edematous, but if left undisturbed it soon returns to normal. The object of the surgeon should be to have the ear, after operation, return to as nearly a normal condition as possible. If this piece of mucous membrane is left *in situ*, you not only get better hearing results but the ear is certainly in a more normal condition than if this membrane is removed and connective tissue takes its place or the aditus becomes totally obliterated.

As Dr. Blackwell had said, closure of the wound down to the tip prevents the formation of a bad scar, but another factor in the formation of bad scars is the tearing of periosteum in retracting the soft parts in the earlier stages of operation. Bone and cortex regeneration can only take place from the periosteum; and if the periosteum is preserved and brought together, the end result will be a new bone formation of thin plate bone to make a new cortex.

Dr. Kopetzky said that the question of a modified radical operation had been settled at the meeting of the International Otological Association at Boston some years ago, and he saw no reason why the subject should again crop up. Dr. Dench's quotation of Millet's remark "that he mixed his colors with brains" and thus produced inspired works of art could be paraphrased by saying that one should mix one's technique with a great deal of pathology to achieve better operations and accomplish the objects for which they are performed. An operation is devised to remove a pathological condition; and it succeeds or does not succeed insofar as it performs this function. Good end results are obtained in proportion as a given technique removes a pathological lesion. In the modified radical operation pathology and technique do not go hand in hand. It will be noticed that Dr. Page is very cautious in his statements but he does not seem to be able to state the indications for the radical mastoid operation and he certainly has traveled far from the indications set for this procedure half a decade ago. He permits himself considerable leeway and decides on his procedure as he explores. He either stops at a modified technique or continues to perform a radical operation according to what he finds. This is very good as far as Dr. Page is concerned, but it should hardly set an example to teachers of otology to thus loosely set indications for a procedure.

One can hardly understand how the saving of diseased ossicles or the removal of a cholesteatomatous mass and the results that a cholesteatome process in the middle ear can be provided for by the modified radical operation. Not desiring to expand upon this subject, we can only express our own opinion that there are no pathological lesions which a modified radical would properly remove.

Otitis media purulenta chronica is a generic term applied to many lesions in the middle ear, all of which have one symptom in common, namely, a discharging ear. The term otitis media purulenta chronica is also applied to a chronic mastoiditis whose exudate passes out through the tympanic cavity into the external auditory meatus; and one uses this term in discussing the indications for any radical or other technique in surgery. Dr. Blackwell's technique in the simple mastoid operation leaves the patient far from the normal after operation and therefore Dr. Kopetzky has never favored this procedure in cases requiring simple mastoidectomy. Dr. Kopetzky can well conceive that cases of short duration which have all the elements of chronicity might present lesions to which Dr. Blackwell's technique could be applied, but these cases are not of frequent occurrence.

Dr. Yankauer made an excellent point about the necessity of removing the stapedius muscle and gives his technique for the closure of the Eustachian tube in another set of chronically discharging ears. On the

other hand, Dr. Kopetzky said, many of his successful radical operations had, upon later examination, shown that the Eustachian tube was patent. In this finding he agreed with Dr. Blackwell. Dr. Yankauer's excellent description of the pathological lesion which exists in many subjects—the production of adhesive bands, the walling off of the mastoid process from the tubotympanic area—shows how easy it is to irrigate through the Eustachian tube and out through the external auditory meatus and eventually to close the tube. This same argument can be employed for washing the tube the other way. The same protecting processes are there and one can, with a syringe full of alcohol, send the fluid through the Eustachian tube into the nose and thus disinfect and irrigate the same area although one does not close the tube. When these patients dry up, after having been treated by this method, they more nearly approximate the normal than when the tube is closed by the Yankauer procedure.

Dr. Kopetzky stated that all will agree that the technique of the radical as described by Dr. Dench was the proper method and that this was the way all of us tried to do it. The discussion of the pathology underlying the indications for the radical mastoid would give us a keener insight. We should not say that "we will do a radical *in these cases*", but rather that "we will do a radical in such and such a *lesion*".

Dr. Kopetzky said that in those cases where Dr. Page would do a modified radical he himself follows an entirely different procedure. He does a simple mastoidectomy and keeps the postauricular wound open for a year or two. Then, when the ear has become dry and the Eustachian tube is patent and the nasopharynx clear, a secondary plastic closes up the opening. In the meantime, while it is open, the middle ear and drum are accessible to medication.

Dr. Kopetzky said that he had never found it necessary in recent years to do a radical upon a child; and he believes that the conservation of hearing and the nearer approximation to the normal are better served this way than by doing any modified or radical operation on a child.

In closing, Dr. Kopetzky congratulated the Section upon having a symposium on such subjects and begged the members to remember that he was simply presenting his own views, based on his own experience.

Dr. George E. Davis said he wished to emphasize one feature of the discussion—what Dr. Blackwell had said about the progress of the technique of mastoidectomy in recent years, along the line of improving the cosmetic results, lessening the painful after treatment, and for primary healing. As all those present knew, he himself advocates a technique which in his opinion accomplishes all these purposes with very little trouble. In a simple mastoidectomy, it is not unusual with a blood clot dressing, for the patient to leave the hospital in four or five days with primary healing, and within a week or ten days—fourteen days at the most—the ear is dry. One of his assistants secured such a result on his first attempt at the operation.

Dr. Davis said he had no criticism to offer to the technique advocated by the essayist for simple mastoidectomy excepting that it was a little too radical. In cleaning out the additus ad antrum, as Dr. Kopetzky said, one should not be too radical. After the exenteration has been made, even if the sinus or dura has been exposed this does not contraindicate the blood clot method. There seemed to be some hesitancy with some surgeons about closing the wound if the sinus or dura was exposed; but, in fact, the wound heals quicker with said exposure. One can put a very small drain at the additus and let it come out at the lower end of the wound; let the wound fill up with blood; each day change the outer or protective dressing and remove the outer drain slightly each day, and in three to five days it can be removed entirely, when the wound will be healed. Occasionally it will break down at the lower end, but you have lost nothing it it does. Dr. Davis said he also advocated the asme method in radical mastoidectomy. It was very important to be careful and preserve the periosteum intact. He employs through and through sutures and brings the flap well over, and in a week the tissue is perfectly hard

and firm; there is no deformity whatever. As regards cosmetic results, painless and quick healing, there is no other technique that compares with it. One does nothing but an outer dressing, and there is no pain involved in that; for there is no contact with exposed surfaces, and it can be discontinued in a week. It obviates one of the most distressing features in mastoidectomy, the great pain, which in children especially is very distressing. Some persons fear the technique because they have had the misfortune of having had brain abscess or meningitis complicating. This is not due to the method but to the faulty technique of the operator. Dr. Davis said he uses no water in the wound, but fills it with alcohol, then adjusts the drain, allows it to fill with blood, closes it, and puts a dry dressing on the outside.

With regard to the radical operation, he does not consider it necessary to apply a skin graft, either primarily or secondarily. Dr. Davis said he was surprised that no one but Dr. Kopetzky had mentioned the blood clot method. You can use a small drain posteriorily in the radical operation, and also a small drain from the inner tympanic wall. Remove drains in a day or two and the blood clot will disintegrate shortly and in three weeks at most leave a dry cavity.

Dr. Maybaum, in closing, said it was interesting to realize from the discussion that at the present time there seemed to be almost full accord in regard to the postoperative care of simple mastoid wound. A few years ago the use of antiseptics and ticght packing was quite the vogue. The results were frequently far from satisfactory.

As to the question of operative technique, he hardly expected unanimity and had therefore prefaced his remarks by stating that there was more than one method of doing a thorough mastoid operation. It is necessary at all times to have a definite systematic plan of exenterating the mastoid cells, to have a clear understanding of the safest way of using instruments, to know not only what to do and how to do it, but to realize what is next to be done. The grouping of mastoid cells for technical purposes as suggested by Dr. Friesner is of invaluable help.

Dr. Maybaum agreed with Dr. Kopetzky that the aditus should not be curetted. All that is done is to enlarge the aditus by introducing a small Spratt curette and reaming out the outer wall. Properly used, there is no danger of dislocating or removing the incus. I am in agreement on the question of devoting one's attention to pathological lesions. The purpose of a simple mastoidectomy is not only to remove disease tissue in the mastoid but to properly drain the middle ear; the latter is facilitated by enlarging the aditus.

It is quite gratifying to note Dr. Smith's enthusiasm for the technique of simple mastoidectomy as originally taught by Dr. Friesner. The men who have been taught this technique gain an assurance and certainty in operating which is so necessary in any operative work upon the mastoid.

Dr. Yankauer closed with a few words about the function of the ear. Some years ago he collected some statistics; 55 per cent of these cases were cured and a large majority of these were improved in the hearing with the closure of the tube; and in no instances was the hearing made worse. This matter should be considered from the physiological point of view. No one can hear by means of the drum membrane; it merely brings the vibrations to the internal ear, etc. In a chronic discharging ear, there is usually such a large perforation of the membrane that no outside vibrations can be transmitted through it and there can be no performance of function through the ossicles. In the radical mastoid operation the ossicles are always removed, and when you do that there is no possible use in having a drum membrane. Furthermore, when the Eustachian tube is closed, the drum membrane cannot close. For if the Eustachian tube were closed and the drum membrane were closed you would have a closed cavity, which cannot persist. When the Eustachian tube is closed, if the perforation in the drum membrane is watched, it will be seen to get larger. The main function of the tube is to equalize the air-pressure. If the ossicles are gone, even if there is a cicatricial

drum membrane, such a cicatricial drum membrane could not transmit its vibrations. Many patients with a chronic suppuration, either with a discharge or after it has healed, hear quite well. How do these people hear who have no drum membrane, when it is not possible to transmit the vibration through the ossicles? These people hear through the round window. Under these circumstances it is better to prevent the formation of a drum membrane, and the best way to prevent that is to get the Eustachian tube to close, for once you get the Eustachian tube to close the drum membrane will never regenerate.

DR. PAGE closed by saying that it was more interesting not to settle down to simply two operations, the simple and the radical mastoid, as some seem to do. He thought that Dr. Kopetzky would find, if he was guided by the pathology as he said, that if he investigated the aditus and attic first before deciding upon operation and even take off the external attic wall to get a better look at the ossicles, he would save a good many of his patients the radical operation or the prolonged treatment he advocated of leaving the mastoid wound open for a year. He would find that he could ventilate through a large meatus and have the patient well in certainly two months, sometimes three weeks, and have no need of any plastic operation afterwards. Dr. Page said he had operated in this way on three cases since February with a full expectation of having to do a radical subsequently, as the patients had cholesteatoma confined to the antrum and attic. The cases had healed promptly and no subsequent operation had been so far indicated.

DR. DENCH, in closing, said that he had not realized that he had laid down the technique of the mastoid operation so well in the first edition of his book. In describing the technique of the simple mastoid operation in his work in 1895, he insisted on the exposure of the upper and posterior margins of the bony meatus as the first step of the operation. The triangle enclosed between one line lying tangent to the superior border of the meatus, one lying tangent to the posterior border of the meatus, and the curved border of the meatus enclosed between these lines constitute a triangle which he first supposed was the one called MacEwen's Triangle. In looking into the subject more closely, however, he found that the three lines were not those described by MacEwen and consequently he has designated this triangle, the "Dench Triangle". Many men who have been his house surgeons will remember that he always spoke of the exposure of the upper and posterior margins of the bony meatus as the important landmark in the simple mastoid operation.

With reference to the introduction of a probe into the antrum, Dr. Dench said that while he was aware that many men laid down the dictum that the probe was not to be used in this way, he thought it advisable to pass a probe from the antrum into the middle ear so as to be certain that the middle ear would be drained as the result of the operation. Bezold many years ago had taught that the mucous membrane of the aditus ad antrum should not be disturbed. He did not agree with this, but always enlarged the aditus so as to clear out all granulation tissue. There was no danger of injuring the facial nerve if the cutting edge of the curette was directed upward.

Dr. Dench also approved of what Dr. Maybaum said about evisceration of all cells, and called attention to the group of cells lying just in front of the knee of the lateral sinus between the sinus and aditus ad antrum. These cells are usually present, but are sometimes shut off from the remainder of the mastoid by a firm layer of bone. If these cells are not obliterated recurrence is apt to take place. Dr. Maybaum's exhibition of the operation was most excellent, but he did not lay enough stress on the removal of the tip. This should be removed in every case of acute mastoiditis. As to drainage and the use of a cigarette drain, Dr. Dench said that he used to be in favor of packing the mastoid very firmly, but he had discarded this method, and now used instead of a cigarette drain, a piece of folded rubber tissue carried into the antrum. In uncomplicated cases, this is the only drain necessary. The wound is then closed by

using a buried catgut suture to appose the soft tissues for about three-quarters of the length of the wound, the drain being brought out at the lower angle of the wound. The soft tissue is then closed for the same distance with Michel clips. Dr. C. R. Holmes, in 1912, first emphasized the necessity of closing the soft tissues and called it suture of the periosteum. For a fact Dr. Dench said that when the periosteum was stripped from the surface of the mastoid, that it retracted so that it was almost impossible to appose the cut edges. If the soft tissues were apposed in the manner described, including the periosteum as much as possible, healing would be much more rapid and the same result would be obtained as if the periosteum were apposed. Healing is much quicker after closing the wound in this manner and there is very little deformity.

With reference to the functional result after the radical operation, Dr. Dench said that in a paper read before the Otological Congress at Paris in 1922, he stated that in only 1 per cent of the cases operated upon was the hearing made worse. It may be said in general that if the hearing is very good in the case operated upon, it will probably be somewhat impaired after operation. If, however, it is very poor, the hearing will probably be improved, provided the cause of impairment of hearing lies in the conducting mechanism alone. If the hearing is moderate, it will probably remain unchanged after the operation. The statistics in the Transactions of the Tenth International Otological Congress in Paris prove this conclusively.

Dr. Dench said that Dr. Smith emphasized the question of landmarks again, and had particularly emphasized the Dench triangle. This landmark is exceedingly easy to expose and invariably lies over the aditus ad antrum. Dr. Smith spoke of using rongeurs, by anchoring one blade and then shaving away the bone with the other. This technique is excellent and Dr. Dench has used it with a great deal of success. The remarks made about using the curette along the course of important structures rather than at right angles to them was also a favorable point and had been long employed by Dr. Dench. Dr. Dench had already mentioned the use of the rubber tissue as a drain, and believes it the best substance with which to drain after operation. Dr. Dench did not, however, agree with what Dr. Smith said about the course of the facial nerve. In some instances he had seen the facial nerve run under the floor of the external auditory canal and had exposed it in this region in two or three cases.

As to seeing the stapes, Dr. Dench said that he never felt that a radical operation was complete unless he could see the stapes, if present. If the stapes had been destroyed by disease, one could then see very clearly the oval window. With reference to injuries of the lateral sinus, he emphasized the importance of inserting a packing over the sinus between the dura and skull, thus pressing the walls of the sinus together and causing obliteration of the vessel. This method is much more effective than plugging the lumen of the sinus. He had never seen a brain abscess occur as the result of packing over the sinus.

Referring to what Dr. Davis said about the blood clot and the radical operation, Dr. Dench called attention to the fact that the blood clot healing occurred only in closed cavities. He would be very glad to see any case of radical operation in which dermatization of the operative cavity had occurred in four weeks, as the result of allowing the cavity to fill with blood.

As to what Dr. Page had said about cholesteatoma in the anterior part fo the cavity, Dr. Dench said that he had very seldom seen any cholesteatomous deposit on the anterior part of the cavity. It never occurs here unless the tubal cells are exceedingly well developed. Cholesteatoma is almost always confined to the upper and posterior part of the tympanomastoid cavity. At a meeting of the New York Otological Society he had called attention to the fact that English surgeons seldom graft in cases of cholesteatoma, for the reason that the mere fact that cholesteatoma is present, causes the cavity to dermatize rapidly with little interference on the part of the operator.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

October 22, 1924.

ENDOSCOPIC SYMPOSIUM.

a. *Endoscopic Methods as Aids to Diagnosis in Diseases of the Upper Airways and Esophagus.* Dr. Hubert Arrowsmith.

DISCUSSION.

DR. FREUDENTHAL said he wanted to thank Dr. Arrowsmith for his interesting paper and wished to make only one remark regarding the intrabronchial treatment of asthma; he had tried it repeatedly and would like the men present to try it again. There is no method by which one could succeed in all cases of asthma. In his hands this method has given good results in a comparatively large number of cases, and even in those where others had failed.

DR. IMPERATORI said that one phase of treatment seemed not to have been mentioned and that was the use of radium in cases of carcinoma of the larynx, bronchus and esophagus. He did not believe that there were any cases of a cure on record. However, cases of inoperable carcinomas of the larynx and esophagus seemed to be materially benefitted; in particular, lessening the pain and prolonging life.

DR. ARROWSMITH said he had tried Dr. Freudenthal's method and liked it very much.

b. *Foreign Bodies in the Upper Airway and Esophagus.* Dr. C. J. Imperatori, Dr. Dever S. Byard, Dr. Willis F. Manges.

DR. C. J. IMPERATORI: In a general consideration of foreign bodies that may enter and become lodged in the upper air passages and esophagus, it is well to remember that they may enter by way of the mouth or they may be regurgitated from the stomach; or, having entered the chest cavity and gained entrance to the lung, they may be coughed up to a place of lodgment. It should also be remembered that in certain diseases masses of necrotic tissue or part of a new growth itself may in the process of ejection become lodged in the passages and thus assume the role of a foreign body.

The usual site of lodgment of a foreign body in the airways, provided its size is such that it may get beyond the glottis, is the right bronchus.

In the esophagus most of the foreign bodies will be found in the region of the cricopharyngeus. In the adult this is approximately 16 c.m. from the upper teeth and opposite the sixth cervical vertebra, while in a child this distance from the upper teeth is but 9 c.m., and the location is opposite the fourth cervical vertebra.

The reasons for these particular sites of lodgment are anatomical. In the airway the right bronchus is more of a direct continuation of the trachea than the left, and it is much larger in diameter, the trachea being 24 m.m., the right bronchus is 23 m.m., while the left is 20 m.m.

In the esophagus, the cricopharyngeus area is crescentic in outline and projects forward with the concavity anteriorly. The lower part of the larynx is directly in front, thus making the greatest diameter of the esophagus, at this point, in the coronal plane. A foreign body is thus very likely to become lodged here because of the contracted anteroposterior diameter; and, secondly, the cricopharyngeus muscle will hold the foreign body.

However, it must be understood that no hard and fast rule as regards the site of lodgment can be given with absolute precision.

Great assistance is given by the radiograph both as to the size, shape and nature of the foreign body. By the X-ray we also determine the location of the foreign body and its relation to other structures. When we encounter the non-radiopaque foreign body we have a somewhat different problem to solve, and the assistance of one accustomed to the study of this condition becomes of vital importance.

Assisted by the stereo-radiograph, and ascertaining the amount of flattening of the diaphragm, the recognition of an over-aerated lung and the

displacement of the heart combined with a previous fluroscopic study, requires the expert and highly specialized skill of a radiographer accustomed to interpret these findings.

Usually very material assistance is given by the radiographer, even in the presence of a non-radiopaque foreign body. Of course, in all of these cases in the event that no material assistance is given by the X-ray and there is the history of the possible lodgment of a foreign body in either the air passages or esophagus, endoscopy is indicated and usually with conclusive findings.

In the peripherally located foreign body in the airways, after ascertaining the location, the removal is assisted by the biplane fluroscope and makes a success of what must necessarily otherwise be a failure.

The patient's history is of major importance and should be given due consideration.

There may be considered two types of foreign body history: One in which a patient gives a regular history of the swallowing or inhalation of a foreign body; and the other type of history in which there is a sudden onset of symptoms indicative of the entrance of a foreign body, but with no definite history of the cause. Of course in infants and young children frequently there will be no history whatsoever.

Methods of removal of these various foreign bodies are each one a problem that has to be worked out for each individual case.

Some general rules that may not be amiss in stating are:

1. Past experience.

2. Axis traction, a term suggested by that master broncho expert, Chevalier Jackson.

Without the proper understanding of axis traction, force becomes necessary and danger immediately threatens.

By axis traction is meant traction exerted in lines parallel to the long axis of the tube—be it bronchus or esophagus that the foreign body is being extracted from.

3. Gentleness in the manipulation.

4. Determination of success with due regard for the patient and the parts under manipulation, and remembering that force may remove the foreign body but the patient may succumb to the after effects of the operation. It is better to desist, if unsuccessful after a certain time of manipulation, and try again at some future date. The foreign body in itself is rarely fatal. The peanut being the exception to this statement.

The instruments used are of great importance, and in my opinion the Jackson type of distally illuminated bronchoscope and esophagoscope and the Jackson type of forceps are more easy of finer and gentle manipulation than the Bruening or Kapler type of instruments.

Results may be measured by the skill and experience of the operator. With proper study of the case in hand, expertness in the use of the necessary instruments and a previous practical demonstration on the manikin, the average foreign body should be removed in nearly 100 per cent of instances.

In peripherally located foreign bodies, non-radiopaque foreign bodies and vegetable foreign bodies in which great expertness is required—success will not be so positive.

These are a few of the problems encountered in this phase of endoscopic procedure—that is, the removal of a foreign body from the airways and esophagus. Several important topics and methods of diagnosis and procedure have been touched upon, and it is hoped sufficiently so to induce a discussion.

DR. DEVER S. BYARD: I wish to offer a brief summary of one hundred cases of foreign body retention. The subjects are of usual age incidence.

1. Age of subject: 1, 10 months; 29, 1 to 4 years; 57, 4 to 6 years; 10, 7 years; 3, 8 years.

2. The foreign body was located: 11, digestive tract; 89, respiratory tract.

3. Site: The site was revealed by: autopsy, 11 cases; endoscopy, 20 cases; X-ray, 69 cases. The cases included were selected because each had a history of diagnostic significance. They are furnished by—reports —two child-caring institutions, New York City (courtesy of their records for this purpose only), and St. Mary's Free Hospital for Children in New York City.

4. Material of survey: St. Mary's Hospital for Children, 20; institutional records, New York City, 35; literature, 1915-24, 45.

5. History: Foreign body incident was noted in 38 histories. Undiagnosed group, 18 subjects; diagnosed group, 20 subjects. Incident suggestive of foreign body incident was recorded in 17 histories. Diagnosed group, 7 subjects; undiagnosed group, 10 subjects. Foreign body incident or incident suggestive of foreign body or diagnostic symptoms noted in 94 histories. Suggestive symptoms warranting foreign body suspicion, 6 histories.

6. Diagnosis: Diagnoses from history, expected, 94 cases; diagnoses from history, possible, 100 cases. Diagnosis clinically made by internists, 70 cases. Diagnosis of foreign body by first observer made in 24 cases; res. tr., 21; al. tr., 3. Observation period: 1-17 days, average 9 days. Undiagnosed foreign body, first observer, 65 cases. Diagnosis of foreign body, ultimately made, 65 cases; res. tr., 58; al. tr., 7. Observation period: 14 days to 1 year, average 4 months. Later observers, 38 cases. Consultants, 8 cases. Routine hospital X-rays, 13 cases. Subject expulsion of foreign body, 6 cases. Diagnosis by autopsy, 11 cases. Incorrect diagnoses, first observer included: Tuberculosis, 20 cases; whooping cough, 20 cases; croup, 10 cases; diphtheria, 8 cases.

7. Fatalities: Early diagnoses by first observer, 24 cases (5 subjects). Undiagnosed (autopsy), 11 cases (11 subjects). Late diagnosed, 65 cases (20 subjects).

The individual practitioner but rarely observes the condition of foreign body retention. His personal experience therefore would afford a small clinical offering. In the place of such discussion, I have presented these statistics, which in a small way emphasize some particulars of our failures. They are significant of the critical and unshared responsibility of the clinician first consulted—the pediatrist—practitioner.

In expectation of result—in damage or death of subject, the importance of the interval between the foreign body accident and the operative incident of its removal is confirmed. Most histories furnish a parent or subject recital of actual foreign body accident: very few lack group symptoms, characteristic of irritation or obstruction. We cannot escape the evidence of the foregoing records that most failures of diagnosis are attributable to an inadequately considered history. Further, they offer implications of our mental state of unawareness.

For the suspected or diagnosed condition of foreign body retention Dr. Imperatori has achieved an admirable survey. To the internist it will be particularly acceptable in that it discloses both the endoscopist's average expectations and his discriminations as to technical procedures.

Dr. William F. Manges: It is a pleasure to come to New York and talk upon this subject of foreign bodies, which is one very near and dear to my heart, as a roentgenologist. I have had the rare opportunity and privilege of working with Dr. Jackson for some years, and so have perhaps had more opportunity to study foreign bodies from the point of X-ray diagnosis than most any other roentgenologist in the country, if not in the world. I feel that I owe the medical profession a great deal that I have not as yet delivered. Many others in my position might have done a great deal more for children and for the rest of the medical profession, but I have brought a few slides to show, and will try to demonstrate what we have done by means of the X-rays in the diagnosis of foreign bodies, and what help we are trying to give in the removal of peripherally-seated foreign bodies in the air passages.

My own feeling is that the most important step in the diagnosis of foreign body is the history. I may go further and say that if there is even the suggestion of a history of the aspiration of a foreign body by an

infant or child, the diagnosis is positive for foreign body unless you prove that it is negative—and that includes observation over a period of weeks and months, necessarily so, because with the aspiration of a large percentage of foreign bodies there is a period of calm during which there are few or no symptoms or signs, occasionally cough, perhaps a little restlessness, perhaps nothing more than that; so that when there is a history of aspiration or a history of coughing while having some foreign substance in the mouth, the diagnosis is positive until you prove it negative. You can prove the negative phase of a metallic foreign body by the roentgenogram, and I will show you that it can be made as nearly positive or nearly negative when the foreign body is not opaque to the X-ray. Judging from the pathology as shown by the roentgenogram, my belief is that the physical sins are most nearly characteristic when they vary very much more than they do in any other known chest condition. I am not qualified to discuss physical signs.

Now, I will show some slides and will try to demonstrate four distinct types of pathological change demonstrable by the X-ray that may take place in the lungs in these foreign body cases. The first is Obstructive Emphysema; second, Retained Secretions or Drowned Lung; third, Atelectasis; fourth, Lung Abscess.

Obstructive emphysema occurs when a foreign body lodges in a bronchus, produces a local inflammatory reaction, and mechanically causes obstruction to expiration, so that when the bronchus expands at inspiration, air gets past the foreign body into the lung, but when the bronchus contracts at expiration, the air does not get out readily, so that there is overdistention with air distal to the foreign body. This may involve a portion of a lobe, one lobe, one entire lung, or even both lungs, according to the location of the foreign body—that is, when it is in the trachea, it will produce obstructive emphysema of both lungs, when in a main bronchus, obstructive emphysema of one lung, and so on according to the location.

Retained secretions are secretions that form distal to the foreign body and that gradually go by gravity into the air vesicles of the lung. The shadow is one of increased density but without evidence of cavity or tissue destruction. Such secretions can mostly be aspirated after removal of the foreign body.

Atelectasis follows when a foreign body is of such size and shape and in such position as to produce complete obstruction to inspiration. The air present in the lung distal to the foreign body prior to complete obstruction becomes absorbed and the lung collapses; and again, a portion of a lobe, an entire lobe, or one lung may be involved. A foreign body producing this type of obstruction would naturally be promptly fatal if it were lodged under such conditions in the trachea.

Abscess is the inevitable result of foreign body sooner or later if the foreign body is not removed. It follows the lodgment of vegetal foreign bodies more quickly than metallic foreign bodies. It is most frequently found in the lower lobes and there is extreme density in the shadows with destruction of lung tissue detail and evidence of inflammatory reaction in the adjacent lung tissue.

The first slide is of a case of obstructive emphysema of the right lung due to peanut kernel in the right bronchus. This boy was able to take a full breath and hold it when I asked him, and also to exhale and stop at the right moment, so that these are illustrations of extreme inspiration and extreme expiration. You will see that the right lung retains its air throughout the entire respiratory cycle, while the left lung empties most of its air at expiration. The heart displaces markedly to the left at expiration and the left diaphragm is very much higher than the right. After removal of the foreign body, full inspiration and full expiration show normal relations throughout the respiratory cycle.

The next slide is one of a peanut kernel in the left bronchus, showing obstructive emphysema of the left lung. The signs are exactly as in the former case only they are reversed as to right and left.

You will notice that at full inspiration the chest in both of these cases has very nearly normal appearance and it would be impossible to make a diagnosis from exposures made only at inspiration. It is the difference between inspiration and expiration that tells the story. Sometimes the obstruction is quite marked and again it is not so nearly complete and the evidence of obstructive emphysema varies somewhat also.

The next slide is of a case in which the reaction was not so striking, but it is positive on careful comparison. From this case, Dr. Jackson removed a portion of a peanut kernel. The following day, the signs were still present, and on subsequent days they became even more positive. The next slide shows that there was extreme expiratory obstruction of the right bronchus about a week after the removal of the first portion of the foreign body. At this time Dr. Jackson removed a second portion of peanut kernel, and the child coughed up a third fragment on its way from the operating room to the ward. After this, the picture at expiration was normal.

Retained secretions is a stage of foreign body pathology that either does not develop or is of but short existence, and, when found, the picture changes from day to day, merging into either a stage of atelectasis or of abscess formation. This next slide shows a striking example of compensatory function of the right lung, with retained secretions in the lower left lobe, obscuring the diaphragm shadow, while the picture at expiration shows clearly that the left upper lobe does not empty its air, so that there is evidence of retained secretions in the lower lobe and obstructive emphysema of the upper lobe on the left side—the foreign body being necessarily in the left main bronchus. After removal in this case there was a certain amount of inflammatory reaction throughout the left lower lobe, but this cleared up rapidly and the child made a complete recovery.

The next slide is of a case in which there was much discussion as to the presence of a foreign body. The history was not positive and the physical signs were very unusual. When I first examined the child on the twenty-third of the month, there was evidence of consolidation in the left upper lobe and at the fluoroscope I felt that there was limitation of motion of the left diaphragm, with retained air at expiration. These exposures as shown by the slides do not represent full inspiration and full expiration. The child was ill and the respirations were very shallow, but at the fluoroscope, while the child was crying, it was evident that there was obstructive emphysema of the left lower lobe. I insisted that the consolidation in the left upper lobe was a pneumonic process that had nothing to do with the foreign body, but that there was probably a nonopaque foreign body in the left lower lobe bronchus. On the twenty-seventh, the pneumonic consolidation had cleared up entirely and the left upper lobe functioned normally. The evidence of obstructive emphysema in the left lower lobe is a little more pronounced than at the former examination. Following this, Dr. Jackson passed a bronchoscope but failed to find a foreign body. Following the first bronchoscopy, the signs of obstructive emphysema of the left lower lobe became still more positive and the Roentgen ray diagnosis also became more positive for foreign body. At the next bronchoscopic examination, Dr. Jackson removed a portion of a peanut kernel, and you will notice that the exposures made at inspiration and expiration, after removal of the foreign body, show an entirely different air picture of the left lower lobe than those taken before removal.

The next slide illustrates a case in which a peanut kernel lodged in the trachea and was of sufficient size so that, together with the edematous inflammatory reaction of the mucous membrane, it caused partial obstruction to expiration. You will note that both sides of the diaphragms are depressed. The heart stands out clear above it and is more vertical than it should be. The exposure made after removal of the foreign body again shows normal relation.

Atelectasis follows complete obstruction to inspiration. In this illustration, the foreign body is a metallic object and its shadow is readily recognizable.

In the next slide, the foreign body is a bean and one does not see the shadow of the foreign body, but it is very evident that the entire right lung is collapsed and contains no air except perhaps a little in the extreme apex of the upper lobe. The heart follows the contracting lung into the right side of the chest. The right main bronchus is completely obstructed to inspiration, and with a history of sudden onset and in the presence of acute illness, one must admit that this constitutes a positive diagnosis of foreign body. All bean cases that I have been able to trace have produced just this condition, and it is because when the bean gets in a bronchus and lodges, it takes up moisture and increases in size, so that obstruction soon becomes complete. You will notice in the next illustration that within a few hours after removal of the bean, the entire right lung is again functioning.

The next slide shows a case in which there was atelectasis of the right lower lobe. There was a history of aspiration of foreign body and a bronchoscopic examination was made under ether, but no foreign body found. In spite of this, the diagnosis of foreign body is positive because of the presence of atelectasis of the lower lobe. Three days later there was an entirely different set of conditions in the right chest. You will notice that now the right diaphragm is very clearly shown; the lower lobe as well as the middle lobe is fully distended with air—in fact, at expiration they are shown to be greatly overdistended with air, so that there is now obstructive emphysema involving both the lower lobe and the middle lobe, and at the same time you will see by the density and the small size of it that there is atelectasis of the right upper lobe. The foreign body shifted from the lower lobe bronchus into the right upper lobe bronchus, where it produced complete obstruction to inspiration, and at the same time projected sufficiently far into the stem bronchus to produce obstruction to expiration and consequently obstructive emphysema below it. The next slide shows the same case after removal of the foreign body when all parts of the right lung, as well as the left, show normal function.

The next slide is of a case in which abscess followed the lodgment of a fragment of corn stalk. It has the general appearance of lung abscess of some standing, regardless of the cause. The diagnosis is not positive for foreign body but lung abscess in this particular location is, in the vast majority of instances, due to aspiration of some foreign substance.

And now a few words about the double-plane fluoroscope apparatus and its use in connection with the removal of foreign bodies. From the photograph of the apparatus, you will see that one X-ray tube is placed beneath the table and the second X-ray tube is mounted at the side of the table. Both are inclosed in the transformer case, so that there are no high voltage electric wires exposed and one may touch any part of the apparatus without getting an electric shock. One has the usual diaphragm opening that may be made large or small and also a control to increase or lessen the amount of current. The patient lies on a sort of platform that is very much narrower than the top of the table and rests on crosspieces so that one may slide it in any direction. The two tubes are so placed as to be in the same cross-section plane, and the central ray is made to pass vertically through the foreign body from the tube beneath the table and horizontally through the foreign body from the tube at the side of the table. The current is controlled by means of foot-switches. The fluoroscope is one of convenient size and is held in the hands of the roentgenologist. I used to use two screens hinged so that one was on top of the patient and one at the side, but I found this rather cumbersome, especially in small children, and I am not using a single screen, 8x10 in size.

The next slide illustrates what we see in the fluoroscope. In this case a bullet entered by violence from the back and was not aspirated. It was not in a bronchus but you will see from the pictures made with the

bronchoscope and forceps in place that the forceps were in very close relation to the bullet, both in the vertical plane and in the horizontal plane. In this case Dr. Jackson went still further and injected bismuth subcarbonate into the bronchus where the forceps had been and established the relations of this bronchus and its branches to the foreign body. It was found, on consulting a cross-section anatomical chart, that this particular bronchial branch might be penetrated without risk of damaging any important blood vessel, and at the next operation, Dr. Jackson penetrated this bronchus, grasped the bullet, and removed it through the bronchoscope. There was no reaction or untoward symptom following the operation.

The next slide shows another type of foreign body which was particularly mentioned by Dr. Imperatori—that is, the pin. It is probably the most difficult of all foreign bodies to remove, and also the most dangerous. It is necessary to protect the point by means of the forceps or tube. It is extremely difficult to see the shadow of the point if it projects less than an eighth of an inch beyond one side of the forceps, and all of the attention and concentration of the roentgenologist, as well as of the bronchoscopist, is required to make traction a safe procedure. The roentgenologist should be sure to get his eyes in the best possible state for viewing delicate shadows, and he should go to much greater length to get his eyes sensitive to a little light than he would for any other sort of fluoroscopy, and he should be especialy careful not to look directly at the light at the end of the bronchoscope. It is apt to produce dark spots in one's vision that may remain for a considerable length of time. The next and perhaps the most important thing is for roentgenologist to make sure that he actually sees the foreign body shadow. He can easily be the cause of a great deal of harm if he mistakes some other shadow for that of a foreign body. It would be much better for the bronchoscopist to go independently in search of the foreign body than to be misguided by the roentgenologist. We just had a case to illustrate this that came from the extreme opposite side of the world. There was a history of aspiration of a button. He was sent with an X-ray diagnosis of foreign body. The evidence in the X-ray was a dense shadow more in the anterior and outer portion of the right lower lobe in an otherwise perfectly normal lung field. It was more or less crescentic in shape, as if it might be a half of a button, but it was considerably thicker than any button that I know anything about. There was pathology in the right lower quadrant—that is, the right lower inner posterior portion of the lower lobe—in the location where foreign bodies usually are found, but in this location there was no distinguishable foreign body shadow. At the first operation, Dr. Jackson was in close relation to the calcareous shadow with his forceps, but found that it was necessary to penetrate a bronchus in order to grasp the object which we saw, and he declined of course to do this. Some days later, when Dr. Jackson decided upon a second bronchoscopic effort, I suggested that he investigate the posterior branches of the right lower lobe bronchus and disregard the calcareous shadow which was entirely outside of the field of active pathology. The results of his efforts was that he brought out half a small pearl button, together with a lot of granulation tissue and much purulent exudate. We had not seen the shadow of the button at all. Following removal of the foreign body, the original calcareous shadow still remained, and I am certain that it is not an aspirated foreign body.

Bronchoscopy in the Treatment of Lung Abscess. Dr. Sidney Yankauer.

Until about ten years ago the treatment of lung abscess consisted entirely of medical and hygienic treatment, but about that time, for two reasons, we began to see more lung abscesses than we had ever seen before. One reason was that more tonsillectomies were being done, and the other reason was that in the various tuberculosis sanitariums they had learned to differentiate between tuberculosis and lung abscess, and had begun to refuse accepting lung abscess cases.

At that time, these lung abscess cases presented a problem not solved by the ordinary methods, even though the specialists were not behind in

their attempts. Cases were treated by spray, by various kinds of vapors and inhalations, by intratracheal medication and by bronchoscopy and aspiration. But these methods of treatment were not successful. The chief reason for their failure was that in attempting to inject medication into a lung, the volume of fluid contained within the chest was increased and therefore fluid occupied bronchi which it did not occupy before. The result was that whatever benefit was obtained by medication was more than overbalanced by the increase in the area involved in the disease. Now the fluid which is contained in the bronchi in the lung abscess cases is a very viscous fluid which adheres firmly to the walls of the bronchi. The viscosity is so high that it is impossible to remove the secretion with the very fine tubes which it is necessary to use to get into the bronchi (we must use tubes 3 m.m. diameter inside and 4 m.m. on the outside), even with the most powerful suction apparatus we have.

The problem presenting itself to me in considering this subject was how to diminish the viscosity and the adhesiveness of the secretions without increasing the volume. This was solved by the construction of a double irrigating canula, through one of whose channels the diluting fluid was injected while the diluted fluid was at the same time aspirated through the other. Since the invention of this method, the treatment of lung suppurations in the hands of the bronchoscopist has been successful. I speak not only for myself but also for the others who have visited the clinic at Mt. Sinai Hospital, who have seen the work we are doing, and have followed the methods. Some of these bronchoscopists have become even more enthusiastic than I am and have reported even better results than mine, and have been notably prolific in devising modifications and improvements of my original apparatus, according to their own individual needs. The results that I have obtained in lung suppuration of various kinds have been as follows:

We have examined bronchoscopically about four hundred cases. Of these only seventy-one came into our hands for endoscopic treatment. These seventy-one cases have been repeatedly treated by simultaneous irrigation and aspiration. The total number of treatments amounts to nearly 3,000. Of the seventy-one cases, eleven cases, 15 per cent, were cured; 15 per cent were unimproved; 50 per cent were improved, and in deciding what sort of cases should be called improved or unimproved, we took as our criterion the ability of the patient to go about his business and to attend to his daily task. Those cases in which amount of secretion was so far diminished that they were able to go back to work and come into the hospital once a week, or once a month for treatment, were considered improved. The cases which could not do this we called unimproved.

A number of the cases went to operation—10 per cent. A number of the cases, about 10 per cent, were unaccounted for.

The greatest difficulty in initiating this method of treatment was to gain the confidence of the general practitioner, who feared danger in the procedure because the cases were sometimes subjected to reaction following bronchoscopy, and this reaction was at times quite severe (rise in temperature for twenty-four hours). Altogether, eight of the cases died, four of these were operated upon and the deaths were postoperative. One of the cases had a myocarditis. She was treated a number of times, in spite of the fact that she could not stand the treatment very well. She gradually weakened and died. Another of the cases was kept under treatment for a year with apparent improvement, but at the end of a year, during an influenza epidemic, became ill with pneumonia and died. Two of the cases died soon after bronchoscopy, due to the reaction; one had a chill and rise intemperature and died in twenty-four hours. The other remained alive for five days when with a rise in temperature she developed pneumothorax and died. These two were the only deaths attributable to the bronchoscopy, and this is the measure of mortality in endoscopic treatment in lung abscess—two cases in 3,000 treatments.

In bronchoscoping a patient for lung abscess, the first bronchoscopy is always a diagnostic one, and the following are the treatments. The

diagnosing bronchoscopy is of the utmost importance. In the first place, we must diagnose the presence of a lung abscess and eliminate other conditions, and in the second place, we must diagnose the nature and character of the abscess itself. The lung abscess must be differentiated in the first place from abscess due to the presence of a foreign body. Foreign bodies of metallic origin are always found by the X-ray. The foreign bodies which do not show by X-ray are another story. In chronic cases they do not give the valve action described by Dr. Manges this evening.

The first case of lung abscess that I bronchoscoped was a patient who denied having inhaled a foreign body, but a chicken bone was removed from his bronchus. A number of other foreign bodies have been found in lung abscess cases, one of the most interesting of these being a patient supposed to have a post-tonsillectomy lung abscess. We found a piece of bone in the abscess cavity which the patient denied having inhaled, but it was later discovered that at the time of tonsillectomy, which was done under general anesthesia, one of the turbinates was removed and on examination of the foreign body we found that it corresponded quite well with the shape and contour of the turbinate bone.

It is important to eliminate in every case, the presence of a foreign body as a cause of lung abscess before attempting to operate upon this condition. Failure to find a foreign body which is the cause of the abscess is rare, and even though it is possible, this fact does not interfere with the statement that every lung abscess case should be bronchoscoped before surgical interference is attempted.

Quite a number of our cases have turned out to be malignant. The examination of our record shows that most of the patients who begin to have symptoms of lung abscess after the age of forty, have a malignant growth even if it is not demonstrable. Benign growths have been found and in both removed endoscopically and the lung abscess eventually cured.

Extra-bronchial growths have been recognized in a number of cases. It is not possible, of course, for the bronchoscopist to make a diagnosis of the nature of the extra-bronchial growth unless it happens that the location of the pressure upon the bronchus is suggestive of a diagnosis. We may find bronchiectasis unilateral or bilateral. When bilateral, operative procedure at the present time is of questionable value.

Having established the presence of a lung abscess, the next thing to be noted is the extent of the suppurating area of the lung. This may be ascertained by bronchoscopy for it tells us from which branches the pus is coming. In this way we can also say with certainty in which lobe the abscess is located. This is particularly of value in distinguishing between an abscess in the middle lobe and one in the upper part of the lower lobe, these two areas being superimposed in the X-ray plate. In like manner, if the abscess is located near the hilus, it is difficult to distinguish by radiography in which lobe it lies, but the bronchoscopy tells us with certainty.

Having determined these features of the diagnosis, we come to the treatment of the cases. In some cases we find at the first treatment that we suddenly get an evacuation of a large quantity of fluid from one of the bronchi. Following such an occurrence there is likely to be a rapid improvement of the condition of the patient, and a cure is accomplished after two or three bronchoscopies. In the cases that we have cured in this way there was probably not a true lung abscess, but a condition which might be characteried as a chronic localized suppurative bronchitis. The rapidity and completeness with which such patients recover from their condition after one or two or three bronchoscopic treatments is one of the most dramatic and surprising things about endoscopic treatment of this condition.

It is quite possible that such a localized suppurative bronchitis may give an X-ray picture showing a fluid level because the pus lies in the same level in all of the bronchi and their superimposed shadows give

rise to this appearance whether the picture is taken in the upright or in the recumbent posture.

On the other hand, a true lung abscess is not present unless ulceration of the bronchi has taken place and pathological communication has been established between them so that there is actual destruction of tissue. When such a well developed abscess has been formed the cavity is surrounded by an area of consolidation. In these cases the bronchoscopic treatment is not so simple nor does a cure result in such few treatments. We may treat such a case by an attempt to evacuate the abscess cavity. For this purpose the canula with a flexible end, devised by Dr. Lynah and which has been combined with a specially constructed bronchoscope by Dr. Lukens, is an admirable device. Previous to Dr. Lynah's invention I had been using a metallic canula to the end of which a flexible wire was attached and the whole covered with a rubber tube. That served the purpose well enough but was not as elegant an apparatus as Dr. Lynah's.

In these cases, the disease is not in the cavity itself, but in the pneumonia surrounding it, and we must attack the disease by attacking the periabscessal pneumonitis. This is accomplished by irrigating each bronchus from which pus is seen to come and to continue irrigation until the lung is clean. In this way the periabscessal pneumonitis is diminished, the abscess wall has a chance to shrink, and the cavity to close.

If we follow these cases with the X-ray, we will find that in the early cases in which the abscess wall is soft the cavity collapses, the infiltration disappears and the X-ray shadow disappears completely, but in the older cases in which the abscess wall is already composed of organized fibrous tissue, the X-ray shadow will not completely disappear but a small shadow will remain at the site of the abscess cavity, indicating the presence of a scar in the lung. One of my cases, a post-tonsillectomy abscess of one year's duration, was cured after eight months of irrigation; the last irrigation was performed in 1917—the patient has been continuously well as far as her lung is concerned during this time, in spite of the fact that the radiograph still shows the presence of the scar in the lung. This patient has been anesthetized twice during this time without disturbing this scar.

Finally, I would like to say a word about the most effective treatment that we know of, the prophylactic treatment. Fully 25 per cent of lung abscess cases are due to tonsillectomy in adults under general anesthesia. If we performed our tonsillectomies in adults under local anesthesia, these abscesses could, with very rare exceptions, be prevented.

The Diagnosis and Treatment of Lung Abscess. Dr. Harlow Brooks.

Lung abscess as it now occurs is a much more frequent condition than it has been in the past. But a few years ago it was a quite rare and unusual condition to find in our wards, whereas, it is now among the rather frequent of the unusual lung conditions which we are called upon to treat.

Naturally, with increase in frequency, has arrived a much more universal ability in diagnosis, so that I think it is rather unusual that the condition is not recognized, or at least considered when it now appears on our medical services. The undoubted increased occurrence is somewhat difficult to explain unless it be because of the increased frequency of those types of infection which most commonly cause lung abscess.

It is generally accepted that many lung abscesses are a secondary result of tonsil operations. This does not, however, account in the least for the increased occurrences in lung abscess in this locality which develops in persons who have had no operation on the tonsils, and this increase is also an undoubted fact.

I shall try to restrict my remarks entirely to the subject assigned for the evening, and I shall, therefore, limit myself to a discussion of the types of lung abscess which follow tonsilar operations. Briefly, they may follow from a bronchial infection, due, perhaps to infected material aspirated at the time of operation. They may also be caused by venous or arterial thrombosis, more probably through the latter, the abscess developing from infected material swept into the veins from the operative site.

Another possibility to which I wish to call attention is that of a local infection developing in the lung from the liberation of organisms or toxines in the course of the operation, just as for example exercitation of an arthritis or endocarditis may appear when an infected tonsil is removed from which a previous arthritis or endocarditis may have developed. Certainly the condition is of sufficiently frequent occurrence in the course of tonsillectomies as they are now performed to cause the internist to stop and consider when he feels that because of their infected condition the tonsils should be removed.

Diagnosis: The diagnosis of lung abscess, such as occurs after tonsillectomy, is not ordinarily difficult. Cough is one of the earliest and most frequent symptoms. It is usually of a dry, persistent and nonproductive type, and it commonly occurs in paroxysms. Not at all infrequently the paroxysmal type of the cough excites a question as to whooping cough, and the differentiation before lung signs appear is not always easy. Later on the cough becomes productive, and the paroxysms appear chiefly in the morning after night's rest in the dorsal position. It becomes finally loose and easy after the abscess has broken into the bronchus and the end of the paroxysm is accomplished with the expectoration of sputum, depending in amount on the size of the cavity and its freedom of drainage. It is notable after drainage through this channel has taken place that after the cavity has been emptied cough subsides. After a greater or lesser period of time another paroxysm follows, terminating again with the evacuation of the abscess contents.

At first the sputum is very scanty and mucoid in nature, later on it becomes more and more purulent. Fetor is present in only a relatively small number of early lung abscesses which develop from tonsilar infection, but it sometimes becomes eventually very marked, quite as much so as when the abscess has developed from empyema, or from a purulent bronchitis or bronchiectasis. Blood is frequently present in the sputum. Elastic fibrils are rarely found and are in small numbers when present. Necrotic material is not very abundant and the sputum in fully developed cases is chiefly composed of pus in which, of course, is to be found various bacteria, among which are probably present those originally responsible for the abscess formation. Anerobic organisms are often present in those cases with fetor, among them, the bacillus erogenes capsulatus. Of course tubercle bacilli are absent unless the condition is complicated by a tuberculosis.

The physical signs depend chiefly on the size of the involved area, on its location, that is, whether it is near the surface of the lung or deep in the central portions about the great bronchi. In the last case detectable physical signs are often very few and difficult to elicit and recognize. The percussion note may be flattened or high pitched, and when the cavity finally drains freely it will vary accordingly as the cavity is empty or filled, hence before and after coughing. Bronchophony and ergophony may be present, depending mostly on the size of the abscess and on the facility with which it drains. Very frequently the vocal fremitus and the breath sounds are diminished or lost over the involved area, or, as in a localized focus of infiltration they may be augmented and definite blowing breathing may be found. After emptying of a large cavity naturally a tympanitic tone or percussion will be found, or the cracked pot note may appear. Gurgling and bubbling rales appear when the pus in the cavity is of a suitable fluid character. A very interesting sign, sometimes present even in deep seated abscess, is pain and tenderness over the site of the abscess. This may be present even when the focus is small.

Even in small abscesses the physical signs are of a sufficiently unusual nature to usually give justification, in association with the symptoms to a diagnosis of a probable pulmonary abscess or of some other sharply localized infiltratory process, as possibly of a tumor. Fluoroscopic and X-ray examination usually leaves little doubt when the findings are taken in association with the symptoms, physical signs, and in the light of the history of the case. Tuberculosis is rarely suggested by the physical or

ardiographic pictures, though the history of the case may lead one to consider this possibility.

More or less temperature is present, at least up to the time when good drainage is established. Even when the cavity does drain well one is likely to find temperature present when the drainage is least and the pus retention highest, that is, in the morning, while at night no fever is present. The expected septic type of temperature is ordinarily present before drainage is established, but afterwards it may be entirely absent or present. A reversed type as just mentioned.

The same is true of the leucocyte count. It may be high before the abscess begins to drain, but after this it ordinarily varies but little from the normal. A relative polynuclear increase is present when leucocytosis is present, but it is usually of very little diagnostic importance.

As a rule, except in very large abscesses, emaciation does not appear, and the patient may be relatively well and comfortable after he had emptied his cavity and the draining bronchial tubes of pus.

The condition must be differentiated from tumor of the lung, from bronchiectasis, chronic bronchitis with peribronchial infiltration, and at times from a Hodgkin's disease, or other tumor springing from the mediastinal or peribronchial lymph nodes. As I have said, diagnosis is not particularly difficult in most instances, and where a confirmatory bronchiescopy is possible it is easy. I strongly advise against diagnostic puncture in diagnosis.

Treatment: Treatment often demands a very wide range of therapeutics. In other instances the case may make a perfectly good recovery with little or no treatment. This depends, of course, very largely on the size of the abscess, on its location, on the character of the infecting organisms and on the natural vigor or resistance of the patient.

Everything must be done to raise the resistance of the patient. Rest, exposure to air and sunlight, a full liberal diet and all the usual measures utilized in the treatment of a resistent bronchitis, or a pulmonary tuberculosis are to be utilized.

Where the condition indicates, iron, arsenic and the other usual measures of treatment may be used. Considerable relief of pain may be furnished by the use of aspirin, salol, atophan and the like, and at the same time the temperature may be thus modified if this seems advisable. Very little relief of cough will be found from the exhibition of the usual cough mixtures, but commonly when the cavity empties the cough ceases, spontaneously.

There is no doubt whatever, but that when satisfactory drainage does not take place automatically it can be often facilitated by coughing in the knee-chest position, or by the patient leaning out of bed with his head lower than the pelvis so that gravity assists in the evacuation of the pus. Where drainage can be readily effected the prognosis is much better, since extension of the abscess through pus retention is not likely to take place. Drainage through bronchial catherization is frequently possible, and I have seen most satisfactory results from the method when it has been conducted by experts in the use of these instruments. Unless this is possible it should not be attempted.

Where it is possible to thus evacuate the abscess no further treatment may be necessary, aside from the maintenance of the health of the patient at its maximum by all the usual measures. A fortunately large number of pulmonary abscesses get well, as it were, automatically, especially when they are not of large size, and the cure once accomplished is ordinarily full and complete. Cure by absorption also takes place with little or no drainage in a probably larger number of cases than we thought possible before we had the advantage of the X-ray in diagnosis. When the case is doing well it is a very wise plan not to meddle too much, and especially not to attempt unnecessary manipulation.

When the abscess is near the lung surface and is likely to rupture into the pleural cavity, thus producing an empyema communicating with the substance of the lung, early surgical assistance seems advisable. A two-stage operation is often done under such circumstances, though of course

this matter of technique should be left to the judgment and discretion of the operator.

Another condition which demands early surgical consultation is when the abscess lies near the hilus and appears likely to rupture into the mediastinal space. These abscesses are particularly difficult of surgical approach, but rupture into the mediastinum is a particularly dangerous thing, and if it can be avoided by surgical intervention it should certainly be attempted.

Where healing fails to take place after drainage has been established several possibilities in the way of treatment present themselves. Where pleural adhesions do not exist the lung may be collapsed down on the cavity, obliterating it more or less by the artificial pneumothorax. The procedure is relatively harmless and it is successful in many instances. More radical measures may, however, be necessary, among which one must consider amputation of a lobe, either directly through surgical means, or by means of the cautery. The cavity may occasionally be widely opened and drained through the thoracic wall.

Lung surgery has made such vast strides of late that one need not hesitate as seemed wise before the surgeons had achieved such notable success in drainage, lobe amputations and with other major operations on the lung. Procrastination should no longer be permitted, and as soon as it seems apparent that no progress is being made under mere medical means, and if drainage and treatment through the bronchoscope is found impractical, one should not wait long before a surgical appeal is made. It is my opinion that the surgeon should be called in consultation relatively early in the case, so that no time may be wasted, once medical measures are found ineffective. Extensive lung destruction may be thus averted, and much time and suffering be saved the patient.

DISCUSSION.

Dr. Le Wald: Naturally I will discuss particularly the diagnostic features from the roentgenologist's standpoint; and I will illustrate the procedure by lantern slides and, incidentally, as far as I know it, give the history of a few cases and will briefly state the origin of the abscess and the method of its treatment. The first case is one which, like some that Dr. Brooks has reported, had a spontaneous resolution; the second case had spontaneous cure with the evacuation of a large amount of pus through a bronchus.

The next case is one after tonsillectomy. We had the opportunity to see the case early, and then a little later there was very foul expectoration; and the appearance of a definite circumscribed lesion, but no fluid level could be demonstrated, but on account of the large expectoration of foul material and the previous tonsillectomy we made the diagnosis of lung abscess. It resolved and has gone on to absolute clearing up, not even leaving a fibrous change.

The next case is one in which seven weeks after a radical breast operation, abscess occurred in the lower lobe. That was cured by a two-stage operation. The typical Roentgen signs of lung abscess of course are the localized area of opacity, and, particularly if one can demonstrate it, a fluid level. It is very important to have the fluid level as a diagnostic feature, but it is not always easy to demonstrate it; and if the cavity is entirely filled so that there is no air in it, no fluid level is seen.

In another case the abscess was located in the central portion of the lung. As Dr. Yankauer stated, in these case it is sometimes very difficult to determine the exact site of the abscess. Dr. Brooks did not mention the subject of clubbed fingers, though I know he looks for that. I have found that the clubbing of the fingers and the watch crystal fingernails are very characteristic. I have noticed it constantly and it is not to be overlooked in the differential diagnosis between lung abscess and tuberculosis.

The next slide is to illustrate the value of a lateral radiograph in the localization of the abscess. It is even better than a stereoscopic view.

We have emphasized the necessity of taking direct lateral views in all cases (Le Wald, L. T. and Green, N. W.: Archieves of Surgery, Jan., 1924, Vol. 8, pp. 265-286).

Here is another case which illustrates the presence of fluid level, with the patient sitting up. This is a procedure which should never be omitted.

Here is the type Dr. Yankauer spoke of, the multiple abscess condition. In this case there were five separate cavities which, however, had different fluid levels. These separate cavities made it a difficult case to drain. Dr. Nathan Green operated and some of these cavities were drained, but one residual cavity was left for some time.

The next case shows an enormous lung abscess in a supposed case of tuberculosis. This cavity was drained and the cavity finally ceased to discharge. This is the largest lung abscess cavity which I have seen. It was supposed to be tuberculous, but was not so proven at operation. The boy made a complete recovery after incision and drainage.

The next case is another upper lobe abscess, twenty-one days after tonsillectomy. This is a lateral view after the first-stage operation, in which the abscess region was packed off with iodoform gauze to form adhesions before incising it.

Here is another difficult case to localize—a central abscess. We took lateral exposures in various postures in trying to determine the exact site of the cavity and the best place to go in to drain it. This particular case is cited to show how a wrong X-ray examination is often made in small hospitals by taking patients flat on the back. By so doing you get no fluid level.

The net case shows the differential diagnosis from subphrenic abscess. This case of subphrenic abscess was very carefully examined and almost everyone thought the signs were such that it was diagnosed as a "chest abscess" or collection of fluid in the pleural cavity. How are you going to make a differential diagnosis? By taking *lateral* exposures we were able to demonstrate the diaphragm, showing that the abscess cavity was distinctly below it. However after incision a long probe was passed by the surgeon, expecting that it would enter the abscess cavity, but it did not, and only after incision through the diaphragm was this pus collection evacuated.

In closing, I would say that no patient is too ill to have a differential diagnosis made by changing the posture of the patient in some way in order to shift the supposed fluid level. If you do not wish to have the patient sit up you can do this in bed or on a stretcher by having the X-ray passed from behind forward in such a way as to demonstrate a fluid level, shifting the X-ray tube instead of the patient.

Dr. Howard Lilienthal said that surgery as well as medicine should be represented in such a discussion as this. Dr. Arrowsmith had suggested that bronchoscopists and internists should work together more, and it is even more important that the endoscopists and the surgeons should work together, as their work runs more on the same lines. There are two differnt kinds of lung abscess, the bronchiectatic and the parenchymatous; the two may coexist or may run into each other, but there are characteristic cases of bronchial suppuration and also of parenchymatous lung abscesses. He stated that the commonest form of suppurative bronchiectasis is that resulting from the aspiration of foreign bodies, usually septic. A second type, parenchymatous abscesses, come from the blood stream and are pyemic in nature. The former may be treated as well as diagnosed by bronchoscopy supplementing the X-rays while the latter may exist for some time without the suspicion of its presence being aroused, although the X-ray examination will usually demonstrate an opacity. He quoted Lockwood, who has well said that lung abscess is a disease of symptoms and not of physical signs. A parenchymatous abscess should be treated through the chest wall if possible before a bronchial communication has been established. Then each cough or strain will tend to empty the cavity outwardly and bring its walls into contact for healing. When a bronchial connection has become established, how-

ever, air escapes through the abscess and out of the wound with far less tendency to obliteration of the infected space. Dr. Lilienthal said that the surgical problem in the treatment of abscesses not connecting with the bronchi is therefore much simpler than when a bronchial opening is present. Unfortunately the diagnosis of parenchymatous abscess is rarely made early. Another division of abscess is into putrid and nonputrid, the exact condition depending upon the organisms present. Continuing, the speaker said that the bronchoscope is a most important adjunct to the surgeon. That he had always been and still was in favor of bronchoscopy before every surgical operation upon the lungs. When he had omitted this precaution he has usually regretted it. A case in point was that of a woman referred to him by an out-of-town physician. She had a cough. The doctor said her tonsils should be removed. This was done, and a few days later the cough became worse and there was mucopurulent discharge. She became ill and septic. Surely, here was a case in which there would be no need to trouble the patient with the added annoyance of a bronchoscopy. There was apparently an aspiration bronchiectasis following a tonsillectomy. Dr. Lilienthal operated, intending to make a chest collapse because most of the left lung was involved in the suppurative process. The patient died and at the necropsy the diagnosis was absolutely confirmed so far as the character of the bronchiectasis was concerned, but a piece of bone as large as a human index terminal phalanx was found in one of the bronchi. It must have been there a long time for it had a calcified coating. Dr. Yankauer suggested that this woman had probably aspirated the bone long before her tonsils had been removed and it was the foreign body and not the tonsils which was the cause of her cough. Dr. Lilienthal thought it quite possible that the edema and suppuration in this case might have prevented the bronchoscopist from finding the bone but he would have at least been saved the chagrin of having omitted an important part of the examination.

The bronchoscope, he considered of great value in the diagnosis of pulmonary tumors. If these are to be safely treated by surgery early resection is necessary, whereas the surgeon now rarely sees these patients until the development of secondary suppuration has made lung resection unsafe. He stated that some day we shall operate upon these cases early because of the diagnosis by endoscopy combined with radiography.

The speaker said that bilateral lung suppuration had been thought to forbid surgery. This was, however, by no means the fact. On the contrary, it made surgery much more imperative than if the disease were unilateral. He had operated in several of these bilateral cases with good results. All these patients should be examined first by ordinary clinical methods, then by X-rays and finally, but invariably, by bronchoscopy.

In taking the history the story of surgical operation whether upon the air passages or upon any other part of the body should be carefully noted.

As to treatment, there was hardly time to take this up fully at present. He said that in the aspiration abscesses, especially in the early ones, artificial pneumothorax should be tested before operative surgery was invoked; that postural treatment also may bring about relief. Even spontaneous cure had been observed. Rapidly progressing putrid abscesses should be treated by early operation.

Dr. Douglas Quick: I can add very little except in relation to malignant disease of the esophagus, and in that can only indorse what Dr. Forbes has said. With all due respect to our X-ray friends, we ought not to accept their diagnosis as final. Direct esophageal examination is most important. Differential diagnosis between cardiospasm and new growth can be settled promptly and believe with greater accuracy. Many kinds of external pressure upon the esophagus which may present an X-ray picture resembling either spasm or new growth can be cleared up in this way. I have had a number of examples of mediastinal nodes infiltrating the esophageal wall and presenting the picture very much like a true esophageal carcinoma.

New growths at the lower end of the esophagus are often primary gastric corcinomas high up along the lesser curvature, which obstruct the lower opening, thus producnig symptoms which bring the patient in with a diagnosis, usually confirmed by X-ray plate, of esophageal new growth. Here direct examination and biopsy will settle the problem.

As far as treatment of esophageal carcinoma is concerned, there is very little to be said. Early gastrostomy is of first importance and should be done as soon as the diagnosis is made. It is questioaable just how much benefit is conferred by the use of radium and X-rays or both. This work is largely experimental at the present time and while we hope that it may be of value, I doubt if anything conclusive has been performed as yet.

DR. LILIENTHAL said he could only call attention to the fact that Dr. Torek's famous patient was still alive, twelve years after operation, now about 75 years of age, and that Dr. Eggers had been fortunate enough to repeat that operation in a man in his thirties. His own patient, who was operated upon without gastrostomy and without entering the pleura, died a year and four months later of recurrence. That shows that one can do something in these cases. He has operated upon ten or twelve other patients by the same method, through the posterior mediastinum without entering the pleural cavity, and in only one case had he found the esophagus movable and alone involved so that it could be pulled away from the surrounding tissues; in the other cases the second stage could not be done because the disease had gone too far into surrounding organs. If we could get the cases earlier we could do better.

DR. LE WALD: I did not expect to discuss this subject but it is very interesting indeed, and I am in complete agreement with all of Dr. Manges' statements. I hope the members of this society will be able to make use of the various distinctive Roentgen appearances due to the aspiration of a foreign body. They are puzzling at first but are perfectly clear after one gives careful consideration to the mechanism which produces the changes in the lungs. We owe a debt of gratitude to Dr. Manges for his very careful analysis of the subject and his splendid illustrations.

THE AMERICAN BOARD OF OTOLARYNGOLOGY.

The American Board of Otolaryngology will hold its first examination during the Meeting of the American Medical Association in Atlantic City, May 25 to 28.

According to the rules of the Board, applicants are divided into three classes.

Class I. Those who have practiced Otolaryngology ten years or more.

Class II. Those who have practiced Otolaryngology five years and less than ten years.

Class III. Those who have practiced Otolaryngology less than five years.

The type of examination is different for each class.

The Secretary, Dr. H. W. Loeb, announces that thus far over three hundred applications have been made.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

THE POSTURAL AND NONSURGICAL TREATMENT OF EMPYEMA OF THE ANTRUM. A NOVEL POSTURE.*

DR. SIDNEY L. OLSHO, Philadelphia.

In the treatment of antral empyema, posture is admitted to be only a supplementary measure. Even as such, the general run of text-books attach, in my opinion, inadequate importance to it. I propose to show how it may become an important influence in the treatment.

The rhinologist diagnosing empyema of the antrum, contemplates the surgical aspects of the case even while the examination is under way. As a matter of fact, a slight surgical procedure, viz: the puncture of the nasal wall with either a trocar or with the Lichtwitch needle, is generally conceded to be a justifiable diagnostic procedure.

I do not wish to disagree with the accepted forms of treatment of antral infections, diagnostic puncture, repeated irrigations, made usually with the view of avoiding more radical surgical procedure. The large proportion of successful results thus obtained renders criticism almost impertinent. But untoward effects may accompany even so simple a procedure as antrum puncture. Numerous patients object to sharp instruments, used for any purpose whatsoever. In an acute case it is difficult to make the puncture absolutely painless. The first time it is done, there is, in almost every patient, an attending nervousness or even some shock. Syncope is not unknown. A certain

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proportion of cases fail to reappear after one treatment and some of these seem to recover without any aid.

Children are not good subjects for repeated irrigation-treatment of antral infections and it is not surprising that for them an early, slight, but effective surgical measure is recommended. The diagnostic puncture presents greater danger in them than in an adult.

Posture for nose-blowing and suction favoring antral evacuation, applicable to children.

In the diagnosis of antral infection, one takes into account the history and symptoms. I shall not dwell upon these familiar things. In the examination, swelling perhaps of the turbinates, the presence of the discharge, the location of the overflow of a filled antrum, each has its familiar significance.

The X-ray is highly useful, but seldom final, in the diagnosis of antrum infection. Frequently we have made our patient comfortable and started him well on the road to recovery before the X-ray report is ready. The X-ray entails some expense, either to the hos-

pital, or to the patient, which occasionally acts as a deterring influence. However, its employment is not to be undervalued.

Transillumination has been useful in my experience, particularly when carried out in a completely darkened room having black walls. I wish to draw attention to an easily constructed effective dark room, described by me in the *Journal* of the American Medical Association, Oct. 8, 1921.

I use the Cameron lamps, which emit an intense white light, and transilluminate the sinuses well in the dark room. I also use routinely, the right angled Cameron dental lamp, by means of which an area of disturbance at, or above the root of any tooth can be almost invariably detected.

I do not care to open up the entire subject of treatment, but desire to touch only upon certain phases of it. In the office treatment I try to get the passages freely opened with weak cocain applications, wash the nose, and then the antrum, if the case be one that requires it. Before irrigating I make slight suction to be certain that the point of the needle is in the antrum. Before again removing the needle, or canula, I expel all fluid from the antrum by air, while the patient is in Escat's position, head held down and opposite ear up.

In the treatment by suction, the use of strong negative pressure is harmful, painful and unnecessary. I do not use a machine and prefer the B. D. Co. one-half ounce asepto urethral syringe, consisting of a glass tube and a rubber ball. The nozzle end fits the nares. The ball is thick and after being compressed to any desired extent, will exert ample pull. If suction is employed for effect on the antrum, one should take advantage of the force of gravity by employing it with the patient in the above mentioned Escat's position. One of the best forms of suction is blowing the nose, and this should be done also while the patient's head is held down, as I will mention again. This position for nose blowing is not to be disregarded, even where irrigations are employed, and is favorable also when permanent drainage into the inferior meatus has been surgically established, as the floor of the antrum is lower than the floor of the nose.

G. F. W., age 44 years, was referred to me Oct. 25, 1924, with catarrhal symptoms, gastric disturbance, and ill health of long standing. His right antrum was filled with evil smelling pus. The infection being of dental origin, the offending tooth was removed. The antrum was irrigated. The cure was rapid. He was discharged Nov. 25, 1924, after the eighth treatment, which included two final negative washings, made after prolonged intervals. The following measures, in my opinion, contributed largely to his speedy recovery:

1. The use at home, with a dropper, of an oil containing: cocain alkaloid gr. ii, camphor gr. i, oil of cinnamon gtt. i, liquid petrolatum f℥ i. Sig: Two or three drops high in the nostril three or four times daily, at the time directed.

2. This patient is in the habit of exercising daily, and while doing so, bends forward on his hips, with the head almost reaching the floor. He is directed to use the oil instillations fifteen minutes before taking these exercises. This oil has a tendency to shrink the turbinates and open the passages. Lowering the head, while exercising, favors evacuation of the antrum.

3. He is directed to place his shoes far under the bed each night, to lie flat on his abdomen on the bed while he is doing so, and while his head is hanging toward the floor, he is directed to blow his nose well. He is directed to instil the oil in his nose about fifteen minutes before carrying out this measure. On awaking he is directed to use a few drops of the oil, and about fifteen minutes later, lying flat on his abdomen, upon his bed, with his head toward the floor, remove his shoes from under the bed. He is to blow his nose well while his head is down in this position. The manipulation of his shoes is merely to remind the patient of what he is to do and to give him his position (or stance).

If one's patient happens to be a gymnasium habitue, I would suggest that he would be benefitted by hanging by his knees on a bar, and blowing his nose as his head is suspended. As a matter of fact, I think that such a person is not likely to have antrum infection of long standing.

I. S., boy, age 5 years. First seen by me March, 1924, said to have had a tonsil and adenoid operation, May, 1923, which was recommended because the patient had a constant thick, greenish discharge from his nose. The discharge continued unabated after the operation. He also had ear trouble, which was treated by a pediatrician. The family and personal history is otherwise good.

The boy is well nourished and well developed. The tonsils and adenoids have been skillfully removed. A few cavities are seen in the teeth in both upper quadrants. Both ears show healed membranes.

The nasal passages contain considerable greenish discharge. The septum is deviated to the right, high up, and well to the left low down. Suspicion is directed to the antra, and transillumination shows these to be dark. The sinuses were X-rayed by Dr. Willis F. Manges. He reports considerable cloudiness of both maxillary antra, as well as a slight involvement of the ethmoid cells; a very small

frontal sinus on the left side and no frontal sinus on the right side; probably some free exudate in both maxillary antra and in the right ethmoids. The sphenoids are clear.

In view of the fact that this boy's health seems not to be unfavorably affected by his nasal condition; of the fact that an antral infection in a child is most likely of the acute type, *i. e.*, without serious mucous membrane disease; of the fact that the mother preferred to have no surgical measures performed, and of the fact that a small boy is not a favorable subject, not even a diagnostic puncture was made. The conservative measures presently to be described, were carried out experimentally, but with complete success. Office treatments, every three or four days, consisted simply of shrinking the turbinates, followed by a very slight irrigation of the nose. After a lapse of fifteen minutes the patient was held by his feet, with his head downward, as shown in the illustration, and asked, while in this position, to blow his nose well. Suction was also applied by means of the urethral syringe, with patient in the same position. Subsequently, the nose was, if indicated, again slightly irrigated with warm saline solution, and the treatment finished with an oil nebulization.

The home treatment was similar. The oil was instilled in the nose and one of the parents held the boy, feet up, head down, as shown in the illustration, and the patient was asked to blow his nose very well. This was carried out two or three times daily. The boy entered into the spirit of the thing and considered it play. While the treatment extended over a period of about three months, the intervals between later office treatments became very much longer than at first, for improvement was marked after a short time. The later visits were, more or less, observations and transilluminations. The patient was finally discharged as the transilluminations were persistently negative and all nasal discharge had disappeared. The postural measures at home were continued uninterruptedly throughout the course of his treatment.

While I have, so far, treated only this one undoubted case, without recourse to even a diagnostic puncture, the measures seem to me so rational, that I want to submit them for general consideration.

The general plan of postural treatment is applicable to all cases, acute or chronic, surgical or nonsurgical. It is submitted as a harmless, efficacious *supplementary* course of maneuvers to be carried out, both in the office, and, in the intervals between treatments, at home.

235 South 15th Street.

UNUSUAL ACCIDENT IN AN ANTRUM OPERATION.*

Dr. Philip C. Means, Santa Barbara, Calif.

A young man recently came to me with an antrum infection which he was first aware of following the extraction of a diseased tooth. After irrigations and the healing of the alveolar opening it seemed cured. Two weeks later he returned complainng of foul discharge from the nose, especially when lying under a car in his work as an auto mechanic. It seemed best to make a wide opening under the lower turbinate and treat it thoroughly. This was done, enlarging it with rasp and punch. Blood and mucopus was washed away with a syringe and curved silver canula, using normal salt solution. The inside of the antrum was not curetted.

When the draping was removed the eye on that side was closed by extensive edema of the lids and orbital tissues, much as we sometimes see in an orbital cellulitis from breaking through of extensive sinus disease. This swelling subsided rapidly and in an hour was mostly gone. Slight ecchymosis remained about the inner canthus and over the area of the lachrymal sac. Though I fully expected infection of the orbit and the formation of an abscess nothing developed. The antrum was easily treated and was promptly cured.

I can only explain this happening by supposing that the rasp detached the tissues up under the nasolachrymal duct and that the irrigating fluid, even without much pressure, but obstructed by clots, followed the duct to the orbit. It shows what unexpected things may happen in nasal surgery. Fortunately the patient took it placidly and asked no questions. I have never heard of a similar case.

402 San Marco Building.

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*From the clinic of the Santa Barbara Cottage Hospital.

AMERICAN BOARD OF OTOLARYNGOLOGY.

The next examination conducted by the American Board of Otolaryngology will be held at the Ambassador Hotel, Atlantic City, on Tuesday, May 26th, at 9 A. M.

Application blanks may be obtained from Dr. H. W. Loeb, Secretary, 1402 South Grand boulevard, St. Louis, Missouri.

MINUTAE OF SURGICAL TECHNIQUE OF SIMPLE MASTOIDECTOMY.*

Dr. Jacob L. Maybaum, New York.

In complying with our Chairman's request to participate in this evening's program, "Symposium on Minutae of Surgical Technique", I was reluctant at first to appear before a group of trained otologists to present the subject of simple mastoidectomy. Considering, however, the frequency with which the simple mastoid operation is done, far more frequently than any of the others to be described tonight, the diversity of operative procedure among different operators, and the necessity at all times for a careful, painstaking technique, there is some justification for presenting the subject. I take it, further, that the prime purpose of this symposium is not only to present the views of the readers of the various papers, but to bring out in the discussion the experiences of others regarding operative procedures and the reason for regarding their particular technique adequate for their needs.

The ideal mastoid operation should have as requisites safety, thoroughness and a due regard for the question of rapidity. There are undoubtedly many methods of exenterating the mastoid. The ideal operation is not by any means in the hands of any group of men, for it can be performed with safety and thoroughness in more ways than one.

The technique which I use was taught to me by Dr. Friesner ten years ago. Some time previously I had learned a quite different procedure in various Berlin and Vienna Clinics. During the past seven years I have taught the technique with Dr. Friesner to many men. There has been no necessity for changing the technique as it conforms to the essentials mentioned above—it is safe, thorough, and can be expeditiously done.

First as to the question of safety. One of the important necessities for acquiring a safe technique is a systematic plan of exenterating the mastoid cells. Purely for technical purposes, Dr. Friesner has divided the mastoid cells into four groups. To safely exenterate the mastoid it is necessary not only to know what to do and how to do it, but to know what to do next. These essential procedures are accomplished in a large measure by a definite system of attacking the various groups of cells. These groups will be referred to later.

*Presented at the Section on Otology, New York Academy of Medicine, Oct. 10, 1924.

Another point conducive to a safe technique is the use of proper instruments and the proper use of these instruments. Most of the men present this evening are familiar with the instruments used.

The gouge which Dr. Friesner has modified is safe because it has a somewhat larger shoulder than usual, thus shoving away any important structure dura or sinus which may be exposed without inflicting any injury. In exenterating the cells it is essential to use the curettes parallel to any important underlying structure, *i. e.*, the dura, sinus or facial nerve. The larger the instrument used the safer. At no time should one permit the gouge to become bound. Overhanging areas of bone are removed before proceeding further. The operative field should be free from blood and bone chips.

An incision is made one-half inch below the tip, one-quarter inch behind and parallel to the auricular attachment and ending at the upper pole of the attachment of the concha. The incision is carried to the bone at one stroke so as to avoid tearing the periosteum during the next step. The periosteum and soft parts are retracted so that the posterior and superior canal walls are in plain view and the tip is completely uncovered. The membranous canal should not be separated from the bony. We have discontinued the use of the self-retaining retractor as separation of the membranous canal is more likely to occur than from the use of a hand retractor.

The spine of Henle is not used by us as a guide to locating the antrum as it is at best variable in size. Using the above-mentioned gouge, a strip of cortex parallel to the posterior canal is removed, beginning above on a horizontal line tangent to the roof of the bony meatus and extending the groove downward to the tip as close as possible to the posterior canal wall. The groove is deepened with a scraping motion from below upwards, using a Spratt curette.

With a large bulldog ronguer, commencing near the tip, the cortex is removed over the entire field of operation. The removal of cortex is begun near the tip because the sinus here is placed deeper. The initial groove (the cells of which are designated Group I) is again deepened, thus opening into the antrum. The opening into the antrum is further enlarged by cutting with the side of a Spratt curette with a boring motion, commencing with the cutting edge of the curette directed upwards, rotating anteriorly and then downwards along the posterior canal wall.

The next step is to remove the cells covering the floor of the middle fossa (Group II). These are uncovered with a fairly large Spratt curette working parallel to the floor of the middle fossa; a Richard's curette may be used here, making long sweeps. All over-

hang is removed with curette and ronguer, special attention being given to the outer antral wall, postantral cells and groove between the floor of the middle fossa and posterior fossa. The initial groove is further deepened, using the upper edge of the bony wound as a fulcrum. The upper and outer aditus walls are enlarged. At this stage of the operation the zygoma cells may be cleaned out. We do not find it necessary to use a probe to locate the antrum as the horizontal canal is a definite guide.

We are now ready to clean out the third group of cells, *i. e.*, those in front of, external to and behind the sigmoid sinus. These cells are removed with a large Richards curette making long strokes paralleling the sinus, beginning at the lower end of the sinus groove. After all cells are removed and inner table is in evidence throughout, all "overhang" and pockets obliterated, the tip is removed with a large curved ronguer, beginning behind and following the digastric muscle. The tip is last to be removed. The fourth and last group of cells—usually of small extent and not always present, are located between the sinus and bulb and internal to the facial nerve. This group is best cleaned out after removing the tip. The reason for removing the tip almost as a last step after the cells of the mastoid proper have been exenterated is to avoid carrying infection into the soft parts of the neck.

The posterior canal wall is now trimmed and rounded off with a small ronguer forceps, care being exercised not to separate the membranous canal with the ronguer. All bony edges are now smoothed by means of a large Richard's.

Suturing: If the inner plate is hard, white and intact we suture almost to the lower end—within one-half inch. If we have reason to believe that we are dealing with a Pneumococcus type III infection, we allow for ample draining by leaving the wound fairly well open. Mastoid cavity is packed with iodoform gauze; this is removed on fourth or fifth day. A rubber tissue drain is carried to the antrum and changed every other day. Under ordinary circumstances the middle ear should be dry in about two weeks; as soon as the middle ear is dry the mastoid drain is discontinued. If we are dealing with a mucosus infection the wound is drained for a longer period even though the middle ear is dry. We do not use antiseptics or irrigation to cleanse the mastoid wound. A number of dry applicators are inserted to the antrum to remove discharge.

The technique of a simple mastoidectomy has been taught to a few hundred men throughout the country and has proved to be highly satisfactory.

12 East 86th Street.

SOME REMARKS ON THE TECHNIQUE OF THE MODIFIED RADICAL MASTOID OPERATION.*

Dr. John Randolph Page, New York.

Those who have developed to their satisfaction a technique for the radical mastoid operation will, with a few modifications, follow the same method in the modified radical for, as Bondy says of this operation. "The resulting cavity, except as regards the presence of the drum membrane and ossicles, has the same relationship as after the typical radical operation". As variations in the technique occur with the different types of cases encountered I may be permitted to mention here a part of the working plan used in our clinic in operating on certain types of subacute and chronic otorrhea.

Except in the obvious cases where no less than the radical is manifestly indicated, we are inclined to enter the mastoid with the intention of performing the radical only if we are led to do so by the degree of involvement found. The following suggestions were submitted to the Clinic last February:

1—Cases in which the acute signs of mastoiditis have subsided but in which discharge continues through a pouting or widening perforation.

Operation: Exenterate the mastoid to prevent deafness and chronic otorrhea.

2—In similar cases in which there is also inflammatory atresia of the canal that might later interfere with access to the drum.

Operation: Exenterate the mastoid and lower the posterior wall to the annulus and construct a new meatus with closure of the posterior wound.

3—Cases which have continuous or intermittent discharge through perforations that show no tendency to heal despite attention to the nose and throat, cleansing treatment, etc.

Operation: Exenterate the mastoid and lower the posterior wall to the annulus, widening the aditus according to the condition found, and construct a new meatus.

4—In cases where there is a varying amount of drum membrane left and sufficient hearing to warrant an attempt to preserve or improve it.

Operation: Same as No. 3 with further widening of the aditus and removal of the external attic wall and, depending on the degree of

*Presented at the Section on Otology, New York Academy of Medicine, Oct. 10, 1924.

the involvement of the attic and tympanum, removal of the epitympanic bridge, etc. Even in cases where there has been great destruction of the drum membrane and marked changes in the tympanum, *provided danger to the patient can be eliminated,* let the conservative operation be tried, and time be allowed for regeneration of the drum membrane or the formation of cicatricial membranes to wall off the tube and effect a dry tympanum.

If, after fair trial, otorrhea still persists due obviously from its salivary and mucoid character, to tubal communication with the nasopharynx, the Yankauer operation for closure of the tube may be tried according to the technique described by its author.

5—Finally, in those cases that have been unsuccessfully treated by such conservative methods, and those that are found at operation to warrant it, perform the radical operation with complete exenteration of the mastoid and special widening of the tympanum to facilitate after-treatment and keep the tubal region well in view.

The operation suggested for the subacute cases with inflammatory atresia of the canal (and this includes not a few recurrent mastoids) may be regarded as a modified radical justified for the reason that the simpler operation leaves the atresia uncorrected. In such cases the technique differs from that employed in cases with greater involvement of the tympanum. After complete exenteration of the mastoid the membranous canal is separated from the posterior bony canal wall and the latter is lowered almost to the level of the horizontal semicircular canal. The membranous canal may then be distended by a strip of gauze passed through the external auditory meatus down to the drum membrane itself. This facilitates incision of it and when the gauze is grasped and drawn through the incisions it reflects the edges next the drum membrane over the facial ridge. Some care in this procedure will prevent an awkward complication from inversion of the canal lining towards the drum membrane and subsequent narrowing in that region. The transverse incision in the distended canal should be 10 m.m., if possible, above the level of the lowered posterior wall. Incisions may then be carried in its long axis to the level of the lowered bony wall and the flap reflected over the facial ridge, where it will adhere and not invert with packing towards the drum. All of the membranous canal external to the transverse incision may then be excised, and there remains to be made only the semicircular incision in the concha to enlarge the meatus.

In such cases it is well not to reflect an epithelial flap as in the radical operation, for a large cavity in the mastoid lined with epi-

thelium tends to collect exfoliated debris. It is better, therefore, to encourage the growth of healthy granulations in the cavity and have it cicatrize and shrink as much as possible.

In cases with greater involvement of the tympanum I am inclined, like Blackwell and Bondy, to remove the external lateral wall of the attic and the bridge as completely as possible for by so doing one is better able to determine the condition of the ossicles and decide whether or not the more conservative procedure is justified, or whether the radical had better be performed. Like Bondy, we have found that support of the drum membrane in the region of the Rivinian fissure is not materially interfered with by removal of the lateral wall of the attic.

Except in cases that have been operated on previously the initial incision that seems to give the least noticeable scar or depression is like a question mark and begins at the tip, not below the attached border of the auricle, and curves sharply backward to the hair line and then upward to be carried well forward to allow retraction forward and clear access to the attic region. Preservation of the canal lining near the drum membrane is important, and even a remnant in this region is worth saving. Quicker dermatization over the lowered posterior wall is obtained from even a small fragment of epithelium near the drum than from larger flaps laid back from the more external portion of the canal, and concha. As in the radical, a narrow bony canal should be widened even after its posterior wall is lowered to give proper access to the tympanic region. The excision of the outer portion of the membranous canal and the thick tissues above and behind it leaves a good view of the whole cavity obtainable through a meatus in the concha of even moderate size, and except for a precautionary drain that may be left for a day or two at the lower angle of the closed posterior incision all after-treatment takes places through the meatus.

The wick at the lower angle of the incision may be removed with the outer dressing on the following day. A full dressing is done on my cases not later than the third day and sometimes on the second full day after operation. The gauze is usually removed under gas anesthesia even to the small piece of vaseline gauze that is placed next the drum to hold the fragment of lining in place over the lowered wall, and before the patient is out of gas the cavity is filled with 10 per cent cocain in boric acid solution so that by the time consciousness is completely restored the cocain can be washed out and a comparatively painless dressing performed. With closure of the posterior wound a retention cavity is formed in the lower part of the

mastoid from which secretion will not drain readily through the meatus. For this reason it is well to keep gauze loosely packed through the meatus into that part of the cavity to absorb the secretion until some shrinkage has occurred and danger of inflammation in the neck muscles has passed. Were it not for this, all packing could be removed after the first dressing and the cavity irrigated every two hours with Dakin's or Zonite solution. My experience has been that it is safer to fill the entire cavity with gauze every day for the first ten days or two weeks before beginning irrigations, although I have obtained some quick results by beginning irrigations of the empty cavity on the third or fourth day. When cholesteatoma has been removed from the attic daily applications of 1 or 2 per cent mercurochrome solution in addition to the frequent irrigations with Zonite seem to have been of value.

127 East 62nd Street.

CHOKED DISC OCCURRING IN MASTOIDITIS WITH EXTRADURAL ABSCESS. CASE REPORT.

Dr. Simon Jesberg, Los Angeles.

K. B., male, age 7 years; first seen June 5, 1924. Complaint: swelling behind left ear and discharging ear. The ear condition began about Apr. 20, 1924, during measles. Three days after beginning of earache there was spontaneous rupture of the drum; the ear has been discharging since; there has been no particular fever nor any chills. About one week ago swelling began behind the left mastoid region with tenderness and slight redness.

Past history: Patient's health always been good. Last year had whooping cough; tonsil and adenoid operation in 1922. No previous ear complaint.

The examination shows a poor nourished, well developed male of seven years. Temperature 99,° pulse 120, respiration 28. The head examination shows no pathology except the left ear and mastoid. The tonsils and adenoids have been well removed; the nose and sinuses are clear.

The left ear: Thin, odorless pus in the canal. M. T., dusky red and swollen; all landmarks are obliterated. No definite perforation

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is seen, although pus appears in the posterior-inferior quadrant. There is slight edema of the posterior canal wall. About 4 c.m. behind the left pinna there is a slight swelling, with tenderness. The mastoid, itself, is not swollen or tender.

General examination: Head, lungs, and abdomen are normal. Urine normal.

Eyes: Normal externally; pupils are equal and react normally; media clear. *The edges of papilla are almost entirely obliterated in the right eye, in the left eye the obliteration is complete with a swelling of the disc of three diopters.* Vision is 20/20 in each eye; the fields are contracted.

General neurologic examination showed no abnormality; no cervical rigidity; no Kernig; no Babinski; special tests for sensory aphasia and cerebellar lesion showed no abnormality. Diadokokinesis is not present.

Simple mastoidectomy was done on June 5, 1924. A T-incision carried back over the posterior fossa; cortex removed, showed an extraduralabscess under the knee of the sinus in the posterior fossa. In other words, an extra cerebellar abscess. The sinus was covered with granulations and contained liquid blood (as demonstrated by aspiration). There was no evidence of the extension of the abscess through the dura. All mastoid cells were cleaned out and sinuses and posterior fossa uncovered. The wound was closed, except space below for 1½ c.m. long, through which drains were inserted through the antrum and the abscess cavity. Convalescence was uneventful. Rise of temperature to 103° a day after the operation, which became normal by the third day and remains so. Repeated examinations showed no indication of intracranial involvement.

Coordination tests, and sensory aphasia tests were particularly tried. The swelling in the discs gradually became less. The vision remained 20/20 in each eye with no abnormality demonstrable in the fields. By July 7, 1924, the wound was completely healed and the M. T. normal, except for scarring. On July 3 he reacted normally to the Vestibular tests.

By Aug. 13, papillae are fairly well outlined; no swelling; vision 20/20 in each eye; hearing is apparently normal; the mastoid wound is still completely healed. The patient is perfectly well, with no abnormal symptoms. Patient has been heard from at monthly intervals, and condition is still normal.

I am reporting this case because of the occurrence of papilledema as a symptom of extradural abscess, with no other symptoms being present indicative of intracranial disease.

1151 West Sixth Street.

CONTRAINDICATIONS TO SURGERY IN ACUTE MASTOIDITIS.

Dr. M. S. Ittelson, Brooklyn.

Cases of acute mastoiditis can be divided for convenience into two classes. The first class includes those cases which are characterized by a marked congestion of the mucous membrane lining the mastoid cells. This mucous membrane is a continuation of that lining the middle ear, and is usually affected whenever the tympanic mucosa is acutely inflamed. In acute purulent otitis media the congestion is mild and transitory; in acute mastoiditis it is severe and more lasting. The second class comprises those cases of acute mastoiditis which are characterized by abscess formation. In these, during the course of the disease, the inflammatory process sometimes extends from the mucous membrane to the bony partitions, causing them to soften and to break down. As a result of this process an abscess is formed which may contain either pus or broken down semisolid necrotic tissue; or, as is more frequently the case, both pus and necrotic débris. Abscess formation is not likely to occur until at least one week has elapsed from the onset of the mastoid symptoms. This period varies, however with the nature of the infection, the type of the causative organisms, and the anatomical structure of the mastoid bone.

In the presence of an abscess a mastoid operation is definitely indicated. It is, however, usually desirable to avoid or to delay surgical intervention when a congestion of the mucous membrane alone is present, since in this condition a mastoid operation may not be needed. Indeed, it is not unusual for a patient to recover without an operation even when the congestion is severe and the mastoid symptoms are prominent. Another advantage incident to such a delay is that suppurative changes may occur in the course of the disease, and there are reasons why it is preferable to defer operation until the bone is soft rather than to attempt operation while the bone is still hard. When an abscess is present it is a comparatively simple matter to uncap the cortex and open the cells. When there is no abscess a mastoid operation requires the removal of the entire infected area—a much more extensive procedure and one which subjects the patient to an added risk. On the other hand, in the presence of an abscess the inflammatory process is usually localized and walled off, and with the advent of drainage, rapid recovery is the rule. When there

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is no abscess formation the inflammatory process is frequently in the active stages, and if operation is performed at this time the cells which are left behind (and some cells are always left behind) later can and sometimes do become infected, healing is delayed, and a secondary operation may be necessary.

The question arises, whether the delay of a mastoid operation until suppuration has developed is not dangerous to the patient. In a small proportion of the cases of acute mastoiditis it must be admitted that there may be some risk incident to such a delay. Since, in fulminating mastoid infections, intracranial complications can occur at any stage of the disease, a mastoid operation before suppuration develops —as a preventive measure—is regarded by some physicians as a highly effective measure. In nonfulminating mastoid infections (and the great majority of the cases of acute mastoiditis are nonfulminating) intracranial complications are not likely to occur before suppuration develops. The danger therefore is very slight if in this type of acute mastoiditis surgical intervention is postponed until conditions favorable for operation have developed.

As a matter of fact, in practice, a mastoid operation is usually performed only when there is reason to suspect the presence of pus. The symptoms which induce the surgeon to operate—persistent pain and tenderness, sagging of the superior auditory canal wall, profuse discharge, and suggestive blood and X-ray findings—are in the last analysis all signs indicating an accumulation of pus. The value of these symptoms depends on how reliable they are as evidences of a suppurative process. There is a growing tendency to minimize the importance of such symptoms which have been found to be of no significance in this respect. For this reason early pain and tenderness as an indication for operation are usually ignored, and a high temperature has lost much of its former significance. Operations are often performed unnecessarily where there is no pus, due to the fact that the prominent symptoms are sometimes misleading. A physician is thus actuated to operate because he suspects pus and fears its presence. Although such errors are sometimes unavoidable, and an exploratory operation may be justifiable, the fact remains that if the absence of suppuration could have been definitely determined beforehand many patients might have been spared the anxiety and suffering incident to surgical intervention.

In nonfulminating mastoid infections the decision to operate therefore hinges on the question as to whether or not pus is present in the mastoid bone. Frequently this information can easily be ascertained. A subperiosteal or a Bezold abscess gives positive evidence

that there is pus in the mastoid bone. The classical symptoms of mastoiditis, if they are present and if they continue over a sufficient length of time, furnish fairly reliable evidence of suppuration. There are, however, many cases of acute mastoiditis in which a diagnosis of suppuration is difficult. In children, in the absence of a cortical swelling, it is always difficult to determine the presence of mastoid suppuration because pain and tenderness are hard to recognize, sagging of the superior canal wall, unless marked, is difficult to make out, and furthermore in a very young child there is no bony canal wall to sag. In the adult, mastoid suppuration is often difficult to diagnose when certain of the symptoms of suppuration are lacking, as is frequently the case. An early diagnosis is particularly difficult owing to the fact that the duration of the symptoms is equally as important as their presence. All the symptoms combined, during the first week of the disease, have less diagnostic significance than can be attributed to any one symptom—such as pain and tenderness, profuse discharge, diminished hearing, or changes in the fundus—which has persisted after three weeks. By the end of this period a diagnosis of mastoid suppuration can often be made by the patient, while in the first week of the disease, the making of such diagnosis is frequently difficult even for the otologist.

The treatment of these doubtful cases is therefore a serious problem. A physician is naturally reluctant to delay an operation when pus is present. On the other hand, because a mastoid operation may not be needed, or because a premature operation is otherwise undesirable, he is, and should be, equally reluctant to advise an operation in the absence of pus. If err he must, how shall he err on the side of safety? It is important to take cognizance of the dangers that are likely to ensue when a needed operation is delayed. It is equally important to take into consideration the dangers that are likely to arise when a needless, or a precipitate operation is performed. It is also important to compare the likelihood with which serious complications may occur under both circumstances. In nonfulminating mastoid infections, where the diagnosis of suppuration is in doubt, the decision as to the advisability of operation depends largely on the results of this comparison.

It is, of course, an accepted principle in medicine that pus anywhere in the body must be evacuated; but the rapidity with which this should be done varies under different conditions. For example, an abscess situated near the larynx may, because of its anatomical relation, induce suffocation; such an abscess demands immediate drainage. An abscess in the region of the appendix may rupture and thus

cause peritonitis; an abscess of this kind also must be drained immediately. But a boil on the neck, an alveolar abscess, or a collection of pus in a cervical gland, or in the breast, does not present the same urgent reasons for immediate drainage. Under conditions of this kind the fever may keep up, the patient may be ill, recovery may be delayed; but fatal, or even serious, results, just because an operation has been deferred, are rare. Many fatalities attributed to a delay in operating are really due to other causes. An investigation of such fatalities will show, as a rule, that, either because the infection was unusually virulent or because the patient had some constitutional disturbance, or for some other reasons, the outcome in all probability would have been the same even though an earlier operation had been performed. Thus we may say that while in some parts of the body pus must be drained immediately, in other localities drainage is less urgent. There is abundant evidence to show that the mastoid bone is one of those regions of the body where the immediate evacuation of purulent contents is not imperative.

Although an abscess in the mastoid bone is anatomically close to the labyrinth, brain, dura and sinus, the involvement of these structures, owing to any reasonable delay in operating, occurs very infrequently. The number of cases of acute mastoiditis in which an operation is delayed, and in which pus is allowed to remain for a varied period of time, must be enormous if one judges from the number of subperiosteal abscesses that are seen daily and from the large pus cavities found at operation; yet the serious results that would be expected to occur frequently because of such retention of pus are rarely reported and in fact they rarely develop. Although the tendency of pus is to work outward, it sometimes burrows inward, when the thin inner plate of bone is broken down, and reaches the dura or the sinus covering. In spite of this, under the usual circumstances both of these structures are able, at least for a time, to resist such an invasion. In acute mastoiditis, perisinus and epidural abscesses recover after an operation just as readily as in the cases of acute mastoiditis which are operated on earlier in the course of the disease, before this condition develops. The fact that serious complications sometimes occur if pus is present and operation is postponed does not necessarily mean that they are due to lack of mastoid drainage, for intracranial complications frequently occur after early mastoid operations. It is thus evident that in many cases of mastoiditis intracranial complications may be traced to causes other than lack of mastoid drainage—causes which are not removed by early surgery. Many physicians are now inclined to feel that a reasonable retention

of pus in the early stages of the disease is not harmful, or rather that such retention does not decrease the chances for the patient's recovery. Mastoid operations are now rarely performed during the first few days of the disease. Over 90 per cent of surgical mastoids are operated upon only after a period of at least one to five weeks has elapsed from the onset of mastoid symptoms.

In discussing the question whether we should operate early or treat acute mastoiditis expectantly, Politzer[1] writes as follows: "The experience of the last few years has taught the author that in many cases the too early opening of the mastoid process—that is, on the fourth or fifth day—has an unfavorable effect on the course of the disease and on the process of healing. One finds especially in those mastoids composed of small cells, which are opened during the first eight days of the disease, several disseminated collections of pus spreading in all directions, instead of one abscess cavity. In such cases the wound heals badly—in fact, much worse than if one abscess cavity were found—as it is seldom possible to remove all the diseased bone-substance. Pneumatic mastoid processes form an exception to this rule; if one operates on these mastoids one finds an extensive abscess even if the disease has existed but a few days. As a rule, the author rarely operates before the eighth day of the disease and thinks one should operate during the first few days of the disease only under two conditions: *1*, when a swelling appears over the mastoid process during the first few days of the disease; *2*, when, without the appearance of such a swelling, rigors and symptoms of meningeal irritation appear—that is, perisinus or epitympanic abscess has developed."

Yerger[2] in considering the indications for mastoid operations says "the acute mastoid cases in which operation is not indicated are the cases without bone destruction or abscess formation, and those not having developed symptoms of serious complications. In these cases watchful conservative treatment for a period of three weeks should be established, for, as Norval Pierce states: 'It requires three weeks for decalcification to occur in the osseous structure of the pneumatic cells and in the absence of obvious complications, unless the intercellular bony trabeculae are broken down, a mastoid operation is not indicated.' ...

"Bezoldt and Siebenmann state that a mastoid operation is scarcely ever indicated before the eighth to the fourteenth day. Politzer rarely operates before the eighth day, and Schwartze rarely ever operates unless the mastoid symptoms continue eight days after the free drainage of the middle ear has been established. That too many

mastoid operations are performed unnecessarily is a well established fact, as witnessed in many cases of acute suppurative otitis media which have been operated on during the first week on account of tenderness over the mastoid fossa."

Another authority who takes a position similar to the one we are upholding is Francis P. Emerson,[3] who writes as follows: "With an acute middle ear and mastoid involvement it may be said that operation is the safer alternative. In order, however, to obtain an early dry middle ear and good hearing it is necessary to choose a time for the operation when the bone abscess has commenced to be walled off by a leucocytic barrier, that is, has commenced to limit itself so that the involved area is definitely outlined and the infection has commenced to subside. . . . We must remember that in all cases of virulent middle ear infection the mastoid is involved, and to operate in the congestive stage means a prolonged middle ear discharge and the danger that deeply placed cells may break down later. This is particularly true if the operation is done when the resistance of the patient is low, as is the case when mastoiditis complicates an infectious disease."

Again, even in the nonfulminating mastoid infections, to have recourse to surgery before pus has formed may not be a safe procedure. Such operations are not infrequently responsible for complications that are sometimes attributed to the disease. Originally, when a mastoid operation was performed only on healthy bones with the hopes of relieving deafness, fatalities occurred so often that for a time the operation was legally prohibited. Notwithstanding the improvement in the technic and the advent of asepsis, if the modern simple and complete mastoid operation were today performed on normal bones a certain number of fatalities would follow. The operative mortality and morbidity is naturally much higher when such an operation is performed on bones which are acutely inflamed, unless the inflammatory process has become localized and walled off, and an immunity to the disease has developed. In certain parts of the body an operation in the acute or the hyperemic stage of the infection is particularly dangerous. It is now generally recognized that an early curettage of a septic uterus may cause septicemia, than an operation in acute salpingitis is frequently followed by peritonitis, and that to curet the ethmoid cells in acute sinusitis is to expose the patient to the danger of meningitis. Similarly in acute mastoiditis, to have recourse to surgery before pus has formed may invite complications which otherwise might not have occurred, either by opening up new avenues for the spread of the infection or by disturbing the balance which

may be maintained in the body between its protective and destructive forces. Early operation has been mentioned as being one of the reasons why some surgeons repeatedly encounter so many more cases of post operative sinus thrombosis and other complications than do other surgeons with an equally large number of similar cases.

Furthermore, under certain circumstances it may be desirable to delay an operation even though pus is present in the mastoid bone. Recently, S. T. Sorensen[4] reported a series of cases of suppurative processes in the mastoid, having their origin in scarlatinal otitis. Of this series 57 patients with acute mastoiditis, in whom operation was delayed until subperiosteal abscesses developed, recovered completely after a simple incision of the abscess. Three patients with acute mastoiditis, in whom the usual mastoid operation was performed early in the disease, died. This author's experience is that pneumonia, uremia, and other evil results are liable to follow any extensive mastoid surgery during the active or convalescent period of scarlet fever. This report deserves serious consideration because of the possibility that similar serious results from early and extensive surgery may occur more frequently than is usually supposed, not only in scarlet fever but in other conditions as well. When a patient is weakened by disease it is sometimes desirable to delay an operation until the diffuse collections of pus have had time to coalesce into one abscess, and until that abscess has enlarged and has approached nearer the periosteum. An earlier and of necessity a more extensive operation in such a patient may be the feather's weight that can tip the scales against recovery.

Of course it must be admitted that under ordinary circumstances, this deliberate retention of pus should not be permitted. The sooner drainage is instituted, the sooner will the patient get well. But in the effort to secure prompt drainage it is important to avoid operating in the absence of pus, inasmuch as such operations are frequently needless and are not without danger. In nonfulminating mastoid infections, where the presence of pus is merely suspected, surgical intervention frequently can be delayed with safety until this suspicion is confirmed.

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458 Fiftieth Street.

ACUTE MASTOIDITIS CAUSED BY STREPTOCOCCI (HEMOLYTICUS AND NONHEMOLYTICUS) ASSOCIATED AT TIMES WITH PNEUMOCOCCI.*

Dr. Philip S. Stout, Philadelphia.

A plea for early operation.

Comparisons with appendicitis.

Hippocrates (460-387 B.C.), quotation from Dr. St. John Roosa, "Describes pain in the ear connected with high fever as a very dangerous disease and he stated that if neither pus escaped from the ear nor blood from the nose the death of the patient usually occurred from the ninth to the eleventh day"—and he further stated that he noticed that acute aural disease sometimes led to fatal results on the third day after its occurrence.

Undoubtedly he was observing what we now know as streptococcic and possibly pneumococcic mastoiditis, and notice how observing he was in regard to the length of time they were ill before they died, nine to eleven days, or others only three days. He naturally was shocked and wrote it so that others might read and be on their guard for a similar circumstance. This was over two thousand years ago and yet the same mistake of waiting too long is made today as it was then.

Since that time we have learned how a mastoid bone can be opened, cleaned, and drained with but little danger, not nearly as much as an operation for appendicitis, and if it is done early enough the mortality in all cases is quite low; while if not done in time, after the sinus and meninges are seriously involved, the mortality is almost 100 per cent if the organisms are streptococci, pneumococci, or both. Often times we see patients come into the hospital who have had mastoid trouble for one, two or three weeks, and sometimes are even treated in the hospital for one, two or even three weeks before operation on the mastoid is advised—and in one case:

Ruth F., age 2 years. This case occurred about ten years ago. This child had been taken to the hospital with mastoiditis. This was a very typical case. She was there three weeks and was sent home as cured and she died within ten days with what appeared to be a general septicemia and some intracranial complications.

Again, another patient: a very recent case.

R. W., age 16 years, was in the hospital about one week, with mastoiditis, was allowed to go home, had a chill and the next day

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returned to the hospital when an immediate operation was performed, but in five days it was a fatal outcome. Pneumococci infection. He died fourteen days from the time he first entered the hospital.

Both these cases were under trained otologists. Is there then any wonder that this occurs to the general practioner? The question arises, can anything be done to overcome this continual fatality? Can we foresee the danger and govern ourselves accordingly? The Mayos say that what we can foretell we can avoid, and for that reason this paper was written.

I have had this paper in mind for a number of years. In 1919 I spoke to a prominent otologist in this city relative to the course of mastoiditis and I said there was some resemblance to appendicitis. He said he had mentioned that fact in one of his earlier papers. It had occurred to him that there was some analogous conditions and I shall use this to drive home the facts I desire to enumerate.

Before the days of McBurney and Murphy, the two Prices, the two Deavers, the two Mayos, and others, appendicitis was looked upon just as mastoiditis is looked upon at the present time by most physicians and the mortality was about 15 per cent—that is, 85 per cent got well without operation and 15 per cent died, or operation was deferred and done only as a last resort. But these surgeons came along and showed that early operation properly done will save about 99 per cent. They had a hard road to travel. There were two camps, the conservatives who waited, and the radicals who operated. Needless for me to say that slowly but nevertheless surely the so-called radicals won, and the lesson of appendicitis has been so thoroughly driven home by the advocates of early operation that it takes a mighty brave physician to advise "watchful waiting" when he has made his diagnosis of appendicitis and has advised the near relatives or the patient what his diagnosis is. They tell him very quickly what they have learned through the various avenues from which the general public get their medical knowledge. There must be a very good reason given if he desires to delay the operation for even a day or two. This has been purely educational and is fixed for all time, and it has saved many hundreds of lives.

Acute mastoiditis, like acute appendicitis, is always a grave condition and the more familiar you become with the uncertainties and complications of mastoiditis the more you realize that you must have very definite knowledge of the various kinds of mastoiditis, classified according to their causitive factor, if you wish to separate those who will get well without operation from those who will not. And even under the most favorable conditions, such as obtain in the large hospitals, I have seen several deaths following "watchful wait-

ing". This is true of all kinds of mastoiditis but more especially is it true of the streptococcic or pneumococcic form. In this, hours, not days count; and the one who waits too long will see his patient go to the undertaker as surely as the one who waits too long with his case of appendicitis. And further, any physician who has a clear and definite plan in his mind to handle his appendix cases can use this same plan for his mastoid cases and he won't go far wrong. Osler long ago (1914) said in Prognosis for Appendicitis, there would be no percentage of deaths from appendicitis if every case, commencing with acute pain and developing tenderness and rigidity of the abdomen, and quickening of the pulse, were operated upon within twelve hours. Notice he says hours, not days or weeks. But in the same book I find not a word about acute mastoiditis. Why not? The general practitioner probably sees more cases of mastoiditis than he does cases of appendicitis, but I do not think he realizes it. He has not been taught. He treats them for earache, headache, migraine, Bell's palsy, meningitis, brain abscess, brain tumor, embolism, endocarditis, sleeping sickness, uremia, septicemia, pyemia, etc. This is by no means his fault. The teaching of mastoiditis is now where the teaching of appendicitis was a quarter of a century or more ago. The average general practitioner and patient have great fear of the operation for mastoiditis. And why? Because so many of the cases are left go so long that when the operation is performed the outcome is often fatal and they seem to hear only of the fatal cases and not of the many successful cases. This was so in the early days of appendicitis operation. Dr. Joseph Price told me himself that he was discouraged almost to the point of giving up because the cases came to him so late and so many of them died. But fortunately he lived to see the day when he and his confreres saw the cases come to them early. Then they could report hundreds of cases operated upon without a single mortality. This must have been one of the most gratifying things of these surgeons' lives. They were the pioneers and had a very hard road to travel and to find that they were right and sustained by the people must have been truly wonderful.

You notice Osler has advised operation within twelve hours for appendicitis. Let me illustrate this also in mastoiditis.

Case C. J. B., age 5 years. I saw him myself for the first, no other physician had been called, therefore I could not put the blame on the other fellow. The patient had severe pain on the side of his head, he did complain some with his ear on that side, but there was no discharge, some redness of the drumhead, no swelling behind the ear, and although there was some vague history about having had

pain in that ear for several days this was the first day they thought it necessary to send for a doctor. This is an important factor, because sometimes these cases have gone several days before the people themselves think it necessary to call a physician. After I found that incision of the eardrum produced nothing but blood and some serum, and that there was exquisite tenderness over the mastoid area on pressure, and that the fever was fairly high, I came to the conclusion that it was a streptococcus infection and advised immediate operation. Quite naturally they objected. Of course they would, they were not educated to this. If it had been an appendicitis case they would, most likely, have consented at once. I told them I would wait until the next day and if he was no better he must be operated upon at once. Of course he was no better and all night long he was delirious. This, I think, frightened them more than anything else and they consented to the operation. The operation was performed the day after I saw him for the first time, and yet, as you will see by his history, he had a very stormy time. It was found that he had a streptocosis hemolyticus infection which already had gotten into his blood stream, followed by sinus involvement, endocarditis, anemia, and distant abscess. This is almost a syndrome for streptococcus hemolyticus. This coccus was found in the pus from the operative field, the blood, and the abscess on the hip. He was in the hospital for three months.

Another case: Streptococcus Nonhemolyticus. Anna H., age 2 years. Always well until ten days prior to the first time I saw her. Her physician sent her to me with a history that he had seen the child each day for three days and that there was no pus from the ear, only a watery discharge, but the child complained of so much pain that he thought it best to have a more thorough examination made. Examination showed a reddened, perforated drumhead and slight swelling behind the ear over the mastoid area, which was very tender on palpation. Fever 101°, pulse 84. The child was operated upon the same day and yet the dura was exposed by the diseased process to almost the size of a dime. The bone was soft and boggy, very free bleeding. With a simple curette the whole mass could be scooped out. The dura with the sinus was exposed, there were some granulations over the sinus. The sinus was not opened, it appeared sufficiently healthy to be let alone, at least for the present. I gave the doctor and the family a very gloomy prognosis, but to my astonishment the child got along rather well. So I believe that this was a double infection. The streptococci were there possibly on the last three days or this would have surely been followed by meningitis. There was no anemia or distant abscess.

Are there any objections to early operation on mastoiditis? Yes. The same as the objection of early operation for appendicitis. First, a certain percentage will get well without operation, about 85 per cent in appendicitis; and somewhere between 10 per cent and 80 per cent in mastoiditis, depending on the kind of germ and the resistance of the patient. Second, it is thought to be dangerous to interfere with a commencing infection, before the patient has formed antitoxin or antibodies, and that you are likely to open new avenues of infection. This is quite true, but if the infection is spreading near the meninges and a large sinus it is a different matter and even if you do have a streptococcic infection of the hand or foot and you find a rapid spreading along the lymphatics is it not the custom to open wide, drain, and sterilize the best you can? This was done by both ancient and modern physicians and I question if any treatment has been found to take its place.

Can we diagnose streptococcic or pneumococcic mastoiditis? I think we can. It comes with but little prodromal symptoms, possibly a slight cold, so-called grippe, influenza; of course there may have been scarlet fever or measles, but the attack itself is rather characteristic. First, some pain in the mastoid area, great pain on palpation, little or no pus from the external canal. Incision of eardrum usually only brings forth blood and some serum, little or no relief from incision of the drum head. Fever 99½ to 102 or 103,° pulse 84 to 110. Leucocyte count not very high at first. Sometimes streptococci are found in the blood from the drum head incision.

Prognosis, somewhat similar to appendicitis. There would be but little mortality from mastoiditis if every case commencing with acute pain over the mastoid area, developing tenderness and temperature, and which failed to respond to incision of the drum head, was operated upon in the first twenty-four hours.

When I was a youngster I worked in a drug store in Philadelphia (1891). I well remember the hot debates between the physicians who came behind the prescription counter. The question then was to operate or not to operate for appendicitis. The arguments were pro and con, the same then as the arguments are now for acute mastoiditis, and those of us who live twenty-five years longer will find otologists reporting hundreds of acute mastoidectomies with almost no mortality, the same as surgeons are reporting hundreds of appendectomies with almost no mortality, regardless of the infecting agent, providing that they get the cases early enough.

"Watchful waiting" in cases of streptococcic or pneumococcic mastoiditis (sometimes called haemorrhagic mastoiditis) makes woeful waste of human lives.

Name: C. J. B. Address: Philadelphia, Pa. Age: 5½ years. Admitted: May 8, 1924. Discharged: Aug. 8, 1924.

Diagnosis: Mastoiditis (acute left).

Family History: Father and mother living and well. Only child.

Previous Medical History: Chickenpox. Suffered at times with pain in right hip.

History of Present Condition: Earache for past two weeks. Child is well developed. Nervous system normal. Lungs O. K. Heart sounds: harsh systolic murmur over mitral area, transmitted to mid-axillary line and up to carotids. No sign of decomposition. O. K. for operation.

Operation, May 8, 1924, *Left Mastoid:* Ether anesthesia. Operation performed by Dr. Stout, assisted by Drs. Hamlin and Mundie. Simple mastoid: the periosteum stripped easily. The bone showed osteomyelitis from one end to the other. There was free pus in the antrum. Neither the sinus nor the middle fossa were exposed. There was a small amount of pus near tip of mastoid.

Laboratory Tests: Wassermann, negative. Blood culture, positive for streptococcus hemolyticus, which was also found in the pus from the field of operation. This streptococcus was also found later from a culture made of the pus from the right hip. The hip condition developed some time after the mastoid operation.

Temperature: May 8, the day of operation, temperature 102½°, to Aug. 8, the day he was discharged from the hospital, his temperature went through all gradations from normal to 105½°. On May 13 and 14 he had a typical steeple temperature of sinus involvement. From the 15th to the 17th he had sustained temperature of between 104 and 105°, which I think was due to pyemia. Later the temperature fluctuated, due to endocarditis and hip abscess, and finally measles.

Leucocytes — May 8, 1924....11,800
May 13, 1924.... 9,900
May 15, 1924....11,400
May 16, 1924....14,300
May 17, 1924....28,300
May 21, 1924.... 7,100
May 26, 1924....14,300
May 30, 1924....14,700
June 11, 1924....15,600

R. B. C. — May 8, 1924....4,000,000
May 13, 1924....4,000,000
May 26, 1924....3,500,000
June 11, 1924....2,970,000

Hemoglobin — May 8, 1924....80%
May 13, 1924....60%
May 26, 1924....60%
June 11, 1924....60%

Urine—Negative for sugar and albumen and casts.

X-ray Diagnosis, May 8, 1924: The right mastoid appears normal; the cells small and indistinct. The left mastoid shows an area near the tip and backward to the sinus, to the cell wall. Process extending throughout the whole area of the mastoid. Diagnosis: Acute Mastoiditis, left. (Signed) Dr. Martin.

Examination by Dr. Grant, May 15, 1924: Child lies quietly in bed; is oriented as to time and place, and answers questions well;

knows all objects. Cranial nerves all negative, except possibly a weakness of right seventh. The right corner of mouth is not drawn as well as the left one. Biceps, triceps, Achilles and patella reflexes are all equally exaggerated. Bilateral ankle-clonus. No Babinski. Bilateral Kernig's sign. Neck slightly stiff. The picture at present suggests to me not a meningitis, or anything else. There is no petechia to suggest sinus involvement.

Dr. Willard, Orthopedic, May 29, 1924: Motion at the right hip is limited in all directions. Muscle spasm is marked. Attempted motion extremely painful. Tenderness over trochanter, upper third of femur and tuberosity of ischium. Also over all the femoral head anterior. Lymphatics in groin enlarged. Motion of left hip is also restricted, but not as much as the right. Muscle spasm develops on the extremes of motion being reached. The X-ray diagnosis is not concurred in. It is believed that the change noted in the right femur is due to inflammation rather than position. Diagnosis: Infectious arthritis, both hips. More advanced on the right side. Treatment by Buck's method to both lower extremities. Treatment suggested: Mercurochrome, 220, intravenously.

Dr. Willard, June 2, 1924: Believe there is pus in the right hip-joint which should be drained. Recommend treatment as marked above.

Dr. Stout, June 2, 1924: Have read your report. Suggest you will proceed as you have suggested.

Second Operation by Dr. Dorsavage, June 3, 1924: Incision of right hip down to, but not into, joint. Several ounces of pus were evacuated. Drainage tube in place.

Professor E. B. Gleason and Dr. Douglas Macfarland were in charge of this case for several weeks and much of the credit for the successful outcome of the above case is due to their efforts.

Name: R. W. *Address*s Philadelphia, Pa. Age: 16 years. Occupation: Student. Admitted: Aug. 14, 1924. Discharged: Aug. 17, 1924; why discharged, improved. Readmitted: Aug. 20, 1924. Died: Aug. 24, 1924.

Family History: Father living and well. Mother died of tuberculosis two years ago. Two other children living and well. One sister had a mastoid three years ago.

Previous History: Measles, scarlet fever several years ago. Has had colds more than the average. Tonsils and adenoids removed several years ago.

History of Present Condition: One afternoon, July 10, 1924, he was seized with a severe pain in the right ear and that night some blood exuded from the ear. This partly relieved the pain. Since

that time there has been a discharge from the right ear, tinged with blood. The day of the onset some glycerin was put in the ear. The next day the ear was irrigated with warm water. The condition failed to improve and on July 13, 1924, he was taken to Dr. S., where he was treated until he was admitted to the hospital. He improved very much while in the hospital and in a few days, Aug. 17, 1924, he was allowed to go home.

Laboratory Tests: Pneumococcic spinal fluid. Urine, negative. Leucocyte 13450.

Operation: He was readmitted Aug. 20, 1924, having taken a turn for the worse. He had a severe chill. The operation was done the same day, Dr. S., assisted by Dr. Stout. An unusual condition was found. The Sigmoid sinus was directly against the external canal and it was found impossible to get into the antrum in the usual way. The antrum was opened by going in from the external canal. The sinus was uncovered and appeared healthy. Some diseased bone was removed around the tip of the mastoid and all necrotic bone removed. The sinus was not opened. Iodoform gauze packing. Two stitches.

We soon began to have evidence of sinus involvement. Typical steeple temperature. Lung embolis fifth day after operation, just as we were ready to do a second operation.

Name: A. H. Address: Philadelphia, Pa. Age: 2 years. Admitted: June 2, 1922, Anderson Hospital, 1711 Green street, Philadelphia. Discharged: June 8, 1922; why discharged, improved.

Diagnosis: Acute mastoiditis (right). Chief complaint: Pain in right ear.

Previous History: Negative.

Family History: Negative.

History of Present Condition: Always well until ten days ago, when some water (?) came out of her right ear. This stopped several days ago and she began to have fever, pain, and sleeplessness.

Laboratory Findings: Streptococci (not classified).

Examination of Patient: Negative except painful and tender right mastoid. No discharge in external canal.

Operation: Jan. 2, 1922, Dr. Stout. Simple mastoidectomy. Usual incision. The bone was soft and boggy, the bleeding was very free. With a simple curette was able to scoop out the soft bone, the dura was already exposed by disease to the size of a ten cent piece, some granular tissue over the sinus. All of the bone was removed the sinus was not opened. Iodoform packing.

The child made an uneventful recovery.

Walnut and Sixteenth Streets.

VACUUM MASTOIDITIS.*

Dr. George F. Keiper, Lafayette, Ind.

Permit me to call your attention to a condition which I reported to the Section of Oto-Laryngology of the American Medical Association in session at San Francisco, in 1923. I have chosen to call it "Vacuum Mastoiditis". Pus is not to be found in the mastoid cells and no pus issues from the middle ear.

Several years before the advent of X-ray diagnosis I was consulted by a lady, Mrs. F., age 28 years, from a neighboring town, suffering from all the classical symptoms of acute mastoiditis. Her pain was terrific and the usual remedies for its control were futile. The mastoid was very tender to touch and pressure. The usual precautions were taken to differentiate psychic from organic pain. Her pain was organic in origin. But on opening the mastoid cells no pus was found, much to our chagrin. Her physician and I thought that an unnecessary operation had been performed. But she was immediately freed from all pain and went on to an uneventful recovery. The lining membrane of the mastoid cells was barely hyperemic and the bone chips revealed nothing unusual.

For quite awhile my conscience troubled me until Dr. Greenfield Sluder, of St. Louis, called our attention to the condition which he called vacuum headache due to occlusion of the fronto-nasal duct, with consequent absorption of the air contained in the frontal sinus. This form of headache yields to nothing except reopening of the duct admitting air to the sinus, restoring the balance there with the outside air, for be it remembered the air presses upon every part of us at the rate of fifteen pounds to the square inch. Then a great light dawned and I realized that I probably observed a similar condition in her mastoid cells; her aditus ad antrum had become occluded, preventing aeration of the cells. The blood will grab off oxygen from the air anywhere in the body if it has a good chance.

I awaited another like case and was rewarded in being called by her family physician, Dr. Harry Laws, to see Mrs. Rose G., Dec. 8, 1920, who was suffering with the tortures of the damned with pain in the left mastoid process. The X-ray plates revealed no pathology. Her temperature was normal. Her pulse was 90 and the

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respiration 36. She was a victim of migraine. Two years before she underwent a successful operation for acute appendicitis. All laboratory examinations were negative. Her pain was organic in origin. I recommended opening of the mastoid process and confidently predicted that no pus would be found but that it was absolutely necessary to admit air to the cells to replace that lost to the circulation of the blood as it coursed through the delicate mucous membranes lining the cells. No pus was found, the mucous membrane was barely hyperemic and the bone chips revealed nothing. The wound was sewed up tight after thorough exenteration of the cells. I may state in passing that the aditus ad antrum is better left untouched. All pain ceased immediately and she went on to an uneventful recovery.

The last case of this trouble which I wish to report I saw but six months ago. Charles C., age 35 years, locomotive inspector, Nickel Plate road, came Feb. 25 suffering with a left mastoiditis, but with no discharge from the middle ear. X-ray plates were negative, as well as the laboratory findings. All remedies used to alleviate the pain were futile. The mastoid was exquisitely tender to touch and pressure. The usual pain tests showed it to be organic. His history revealed that four months before while inspecting a locomotive, on alighting he slipped and fell, striking the left mastoid process. It has been tender ever since, but the pain was slight and bearable. But for the week preceding his visit to me he began to suffer tortures with the pain in that mastoid process. His physician, Dr. A. C. Arnett, obtained no relief from the usual remedies used for the control of pain and he referred him to me. His temperature never rose above normal and likewise his pulse. Examination, among other things, revealed a retracted ear drum with stenosis of the Eustachian tube. X-ray plates were negative. Laboratory examinations were negative. His pain was organic to the usual tests.

Here was an interesting situation as to compensation under our laws. Was the condition due to the accident or to some intercurrent trouble? Was the railroad liable or the patient himself for treatment? Of course I recommended opening the mastoid cells, with the prediction that no pus would be found. If the aditus was occluded with bony formation, which takes time to form, then the liability was to be with the railroad, but if with an inflammatory thickening then the liability was to be with the patient.

I asked the local surgeon, Dr. A. C. Arnett, to assist me in the operation. As we uncapped the mastoid cells he remarked that he could see the air bubbling into them through the overlying blood.

After thorough exenteration of the mastoid structure we explored the aditus ad antrum and found the occlusion to be a bony one. We could not enter the middle ear and we did not persist in our efforts. The liability was then clearly with the railway company. The wound was sewed up tight and he went on to recovery promptly, relieved of the severe pain which he previously suffered.

At the last meeting of the American Medical Association, Dr. Samuel J. Kopetsky, of New York, in the Section of Oto-Laryngology called out attention to similar conditions showing slides of bone removed from advanced cases with hemorrhagic infarcts therein, *i. e.*, in the advanced stage of the trouble. Dr. John F. Barnhill, of Indianapolis, in discussing the paper, among other things, said "physicians who witness mastoid surgery in the class, often express the belief that, since no pus was present, the operation seemed wholly unnecessary. Such, however, is not the case, since early operation often gives most brilliant and gratifying results."

As intimated above, care must be exercised to distinguish between psychic and organic pain. Psychic pain is *1*, cortical in origin; *2*, neurotics will not allow the examiner to touch the alleged tender mastoid, complaining that combing the hair is very painful. If the examiner will distract the attention of the patient and then touch the mastoid no pain is produced; *3*, the pulse rate and blood pressure are not raised when thus touched; *4*, the pain reflex in the tissues surrounding the eyes is not present; *5*, the patient does not shrink away when the tender spot is touched; *6*, there is no dilatation of the pupil; *7*, sleep is not interrupted.

On the other hand organic pain is *1*, optic thalamic in origin; *2*, the patient is willing that the examiner touch and explore the tender spot; *3*, the pulse rate and blood pressure are raised; *4*, the facial expression is characteristic: the palpebral fissure is narrowed and the evebrows are knitted and the forehead furrowed with wrinkles, for the pain is optic thalamic; *5*, the pain reflex is present; the patient shrinks on touch; *6*, there is dilatation of the pupils; *7*, sleep is interrupted.

An analogous condition is present on the other side of the aditus in the middle ear. Vacuum earache is common in children. The child thus affected awakes crying with earache. The muscular movements involved open the Eustachian tubes and the middle ear is areated and the child drops off promptly into quiet sleep.

14 N. 6th Street.

OSTEOMA OF THE FRONTAL SINUS WITH A REPORT OF THE CASE.

Dr. F. H. Lee, Richmond, Va.

These rare, slow-growing tumors, at one time called "petrified brains", and to the old physicians a source of much mystery, are of historic interest. They not infrequently produced hideous deformity and death, and because of the unfavorable results of operative interference provoked a dismal prognosis. The supposed futility of radical surgery is evidenced by Berlin's advice to remove only the eye in cases of frontal sinus osteoma with rupture into the orbit. Sir John Bland-Sutton cites an interesting case in which a swelling the size of a pea was noticed at birth. At the age of 9 it had destroyed the eye. At the age of 25 the skin of the brow sloughed; and eight years later the tumor fell out of the orbit. In 1881 Herman Knapp reported 11 cases of osteoma of the frontal sinus, of which, his own was the first recorded in this country. In 1907, Gerber reported 87 true cases of frontal sinus osteoma, and E. C. Sewall in 1918 added cases from the literature with the report of his own, bringing the number to 93. Since Sewall's report I have counted 6 cases in the literature, as follows: Reeve, 1; Barnhill, 1; Boardman, 2; Thomas, 1; and Reh, 1. This brings the number of cases, including the one here reported, to 100. It is interesting to note here, that Culbert, in 1918, gave a rough total of 215 as representing the number of all cases of osteoma of the nasal accessory sinuses in the medical literature since 1748, and that the frontal sinus holds a large share of this number, nearly one-half. Kikuzi, analyzing 54 cases, found 26 frontal, 11 ethmoidal, 11 antral, 5 sphenoidal, and 2 nasal. On the other hand, Gerber gives the percentage of those arising in the ethmoid as 12 to 8 to those arising in the frontal sinus. An idea of the infrequency of occurrence may be gotten from Andrew's report of 8 cases of bony growths of the orbit out of nearly 430,000 cases of eye diseases. As to age, about 50 per cent occur during adolescence, and 80 per cent occur under the age of 50.

Histopathic Origin: Various theories have been advanced as to the origin of osteoma. The question does not seem to be definitely settled. According to Ewing, histologic study fails as a rule to distinguish between simple hyperplastic growths and true osteomas; and

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that the gross and clinical features seem to offer the best criteria by which to separate them; also that limitation of growth is characteristic of the inflammatory type, but that true osteomas progress steadily until extirpated. Though the growth of an osteoma may be over a period of ten years or more before causing annoying symptoms, there may be comparatively rapid growth, as in the case reported by Thomas, in which one year after extirpation the tumor had grown to twice the size it was before operation. Osteoma may be composed of either the compact or cancellous type of bone. The former is the usual type seen in the frontal sinus and in consistance may be like ivory.

Fig. 1. Drawing of the patient before operation; showing the tumor in the inner canthus of the right eye and the marked ocular displacement.

Etiology: Though the writers are not entirely in accord as to the etiology most of them can find expression of their views in Culbert's summary, which in substance is, in osteomas of the nasal accessory sinuses there is in all probability a congenital defect which may or may not be stimulated to activity; the activating influences being: the unusual activity in the frontal region during adolescence; endogenous irritations and external traumatism.

Symptoms: Primarily the symptoms must be classed as those due to pressure. Of the early symptoms, if there are any, headache is the most frequent. Later the symptoms will depend on the cavity encroached upon. Displacement of the globe, symptoms depending

upon complicating infections, embarrassment of nasal respiration, and symptoms of intra-cranial pressure may be mentioned as likely to occur.

Diagnosis: Radiographic findings make the diagnosis self-evident. Where the tumor can be felt there is little difficulty experienced, and where there is beginning displacement of the globe or distension of the sinus, without well founded cause, it should be suspected.

Prognosis: Gerber gave apt expression to the condition in saying that these tumors had the peculiarity of benignancy of histologic

Fig. 2. Photograph taken eight weeks after operation; showing that the eye has returned to practically its normal position. In this picture the deformity of the brow is exaggerated and there is an apparent ectropion of the lower lid which does not exist.

structure but malignancy of effect upon surrounding structures. The following mortality statistics of Birch-Hirschfeld serve to give a good idea of what the surgeons formerly faced in encountering these cases. Unoperated: frontal, 48.2; ethmoid, 80.0; sphenoid, 100.00; operated: frontal, 13.6; ethmoid, 12.7; sphenoid, 33.0. Death was usually caused by meningitis or cerebral abscess, and even today these complications cause us most concern, so that a sinusitis complicating

an osteoma would make the prognosis less favorable. Since the introduction of asepsis and the improvement of surgical technic, especially since Killian's work, the prognosis following operation is certainly favorable in the early cases, and much more so than formerly in the advanced ones. The difficulties of removal depend upon the size of the growth and the extent of its attachment.

Treatment: The treatment is early extirpation of the tumor. The technic is somewhat after the modified radical Killian operation with extension of the inner end of the skin incision upward if necessary.

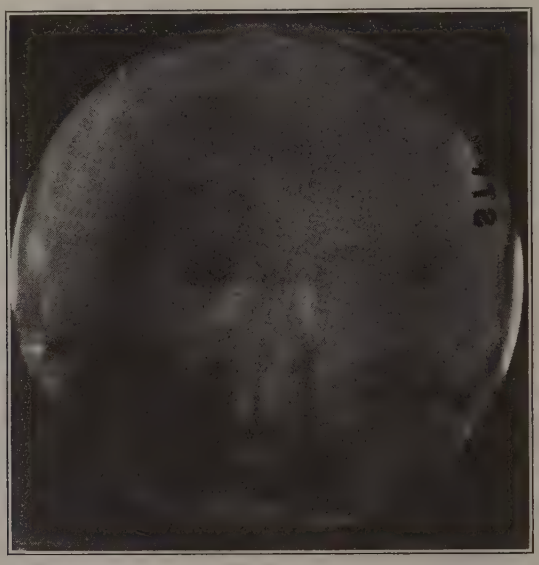

Fig. 3. Radiograph of the sinuses before operation, front view; showing the tumor nearly filling the large right frontal sinus and protruding into the orbit. A distinct tumor can be seen in the upper inner angle of the left frontal sinus.

The compact tumors when connected by a pedicle, or the attachment is not too extensive, may be removed by gradually prying and rocking the tumor free with suitable instruments. Care should be used to avoid opening the dura; and when the operation is at all extensive external drainage should be established.

References will be given to the literature reviewed, on which, this introduction is based. Sewall's and Culbert's reports are excellent and carry full bibliographies.

Report of the Case: J. H., male, age 17 years, colored, errand boy, was first seen May 22, in Dr. Karl Blackwell's clinic at the Medical College of Virginia. He complained of a swelling at the upper part

of the inner angle of the right orbit. The patient said he had no other symptoms, and that he knew the swelling was there only when he looked in the mirror. It was first noticed one year ago. The growth increased in size and then he thought it decreased some. On Apr. 1, 1924, he bumped his forehead against the end of a wagon, cutting the skin of the brow 1¼ inches, temporally. The wound was treated surgically and healed without trouble; but since then the tumor has grown rapidly. When questioned about diplopia and epiphora he said he had the former occasionally and the latter when

Fig. 4. Radiograph of the sinuses before operation, lateral view; showing invasion of the cranial cavity.

reading. I noticed he closed one eye when reading. The family history and his past history were negative.

Inspection revealed a slightly tender tumor, about the size of a small cherry, apparently pushing through the upper, inner and under margin of the orbit. To touch it felt as if it were a smooth, round, bony growth bearing slight resilience. There was edema of the surrounding tissue and the lid drooped. The globe was pushed forward, outward and well downward. The head was tilted on the horizontal and vertical axes to the right. Examination of the globe was negative, excepting a slightly dilated pupil. The vision in the right eye was 20/30, in the left eye 20/20. In the light the pupil of the right

eye measured 3 m.m., in the left eye 2 m.m. The pupils reacted directly and consensually; but a little slowly in the right eye. The accommodation was 8.5 diopters in the right eye. The interpupillary distance was 70 m.m.; pupil O. S. was 32 m.m. from the midline; pupil O. D. was 38 m.m. from the midline, and 8 m.m. below the horizontal plane. The ocular movements were good in all fields, probably O. D. lagging in the upper cardinal directions. Screen test, O. D. turned up and in; O. S. turned down and in. Binocular uncovering, O. D. squinted down and out; O. S. squinted up and out.

Fig. 5. Radiograph of the sinuses after operation, front view; showing small part of the tumor left in the upper median part of the right frontal sinus and the separate growth in the left frontal sinus. The anterior edge of the remaining shell can be seen, faintly, immediately to the right of the septum of the frontal sinuses.

A plot of the diplopia mapped on the tangent curtain gave in all fields a rather marked vertical separation of the images with slight horizontal separation. There were slight changes in the various fields.

The field of vision was practically normal. The upper nasal quadrant was encroached upon, but this was due to the swelling protruding into it.

The right side of the nose was free from obstruction and secretion, and presented a healthy mucus membrane. The throat examination was negative. The sinuses did not transilluminate. All other examinations were negative; including the blood (Wassermann), urine,

physical, and neurological. The radiographs confirmed the clinical diagnosis of osteoma of the right frontal sinus.

On June 22 the patient was operated on at the Memorial Hospital. The brow was shaved and strict asepsis observed. The mass in the orbit was easily extirpated and found to be thinly encapsulated. The sinus was opened and the tumor was immediately encountered. The mucus membrane was very thick. With a ronguer the tumor was exposed anteriorly and was removed with the ronguer and curette. The cranial cavity was entered at the upper medial part of the sinus,

Fig. 6. Radiograph of the sinuses after operation, lateral view; showing the remaining shell. The partly flexed hand will serve to explain the prominent shadow in this view.

the dura being exposed about 10 m.m. sq. At this point the tumor had eroded the sinus wall. It was in contact with the dura, and was thinly encapsulated. The floor of the sinus was removed, making an opening 10 m.m. sq. into the orbit. The bony brow was so encroached upon that it was removed for a distance of 2 c.m., precluding the possibility of retaining a cosmetic bridge. The tumor was curetted away to points beyond which I did not think would be reasonably safe; that is, the posterior wall in the median line, including the frontal crest, and the portion of the frontal just external to the

cribriform plate. With this there was left the small but distinct tumor in the left frontal sinus. While removing the main mass, encapsulated lateral nodules were pried from their beds in the sinus wall leaving behind smooth pockets. The wound was closed with external drainage established. The growth was evidently of the cancellous type of bone.

The patient had an uneventful recovery from the operation. The wound healed well and all stitches were removed on the eighth day.

Dr. W. H. Cook, the pathologist, submitted the following report: "Tumor-like growth of fibroblasts which are producing large amount of collagen fibrils and frequently are being transformed into osteo-

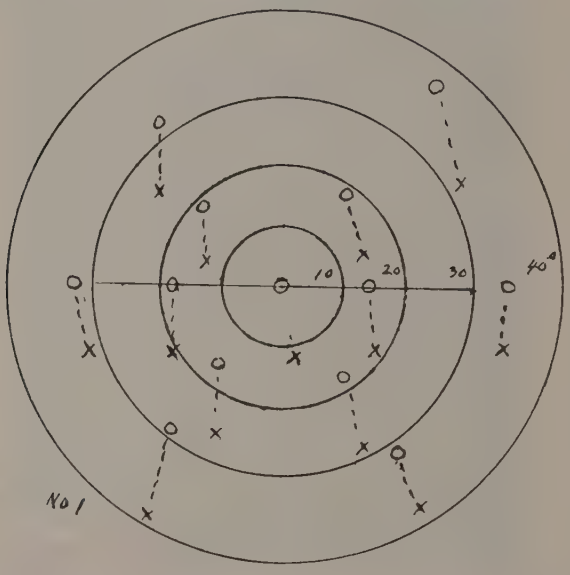

Fig. 7. Plot of fields of diplopia, before operation, at 75 c.m.; red glass over left eye; the right eye fixed; showing considerable separation of the images.

blasts with formation of bony trabeculae. Mitotic figures are not observed. Pathological diagnosis: osteoma (inflammatory exostosis).

Dr. J. L. Tabb, the roentgenologist, took pictures on the ninth and reported the following: "Majority of tumor removed. Small portion of tumor remains behind the upper portion of the right frontal sinus compartment, and apparently behind the upper portion of the left sinus close to the midline." If the right hand, semiflexed, is held up it will give a good idea of the remaining shell, and how it cast the prominent shadow in the lateral view. The shadow cast from the left sinus is from a distinct tumor.

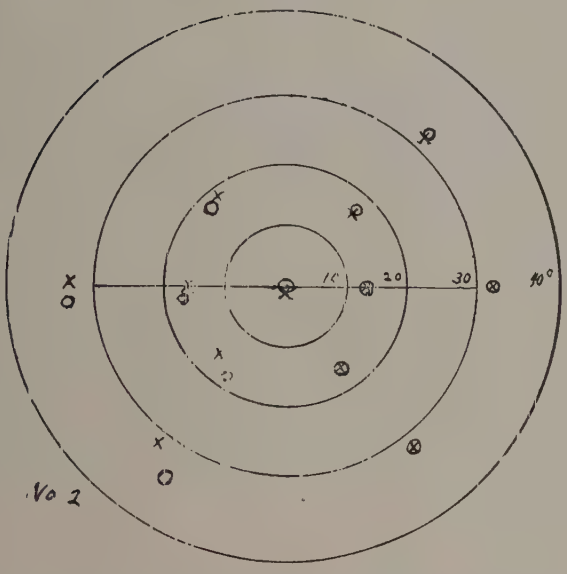

Fig. 8. Plot of fields of diplopia, twelve days after operation, at 75 c.m.; red glass over left eye; right eye fixed in fields on the right; showing the decrease in the separation of the images with fusion in two fields on the right.

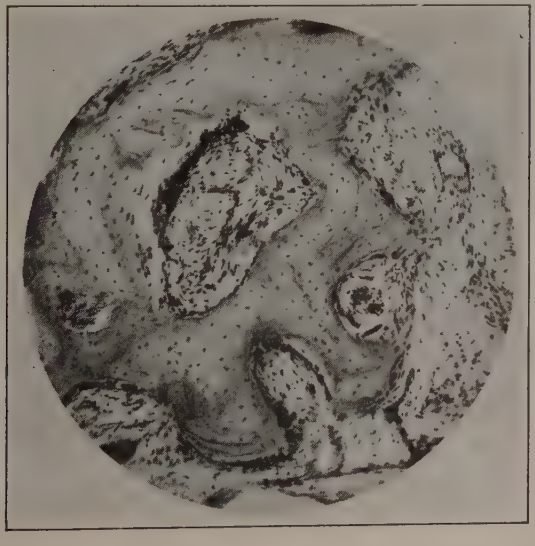

Fig. 9. Photo-micrograph of section of the osteoma; showing average microscopic appearance under the high dry lens.

Aug. 2, 1924. There is some proptosis of the right eye. The visual acuity is 20/30 corrected to 20/20 with a plus 0.75 cyl. ax. 75. There is binocular single vision in the right fields. In the left fields the patient has a vertical diplopia which increases in the field of action of the right superior oblique, though there seems to be no limitation of motion. There is no annoyance from the diplopia as the patient overcomes it by slightly tilting his head to the left.

Conclusion: The operation was undertaken with the hopes of extirpating the tumor, but in that it was the cancellous type of osteoma with an extensive posterior attachment and in that it abutted or attacked a most dangerous area, the region of the cribriform plate, it was considered safer to leave a shell rather than enter the cranial cavity in this region. Later, if the symptoms justified it, or there was further invasion of the cranial cavity, complete removal of the growth would be undertaken. The growth in the left sinus, which seemed to be formed around the upper part of one of the septa, was to be dealt with later.

From the negative findings of a thorough examination of the patient, and from the physical features of the tumor, especially its being encapsulated, I regard the growth as a true osteoma with an inflammatory phase superimposed upon it by traumatism which played no part etiologically but acted only to accelerate its growth.

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114 North Fifth Street.

607 Professional Bldg., 114 North Fifth Street.

HERPES ZOSTER OTICUS RELIEVED BY SPHENO-PALATINE GANGLION TREATMENT.*

Dr. Simon L. Ruskin, New York.

Herpes zoster oticus is a rare condition especially when involving the tympanic membrane. I was forunate enough to observe the herpetic eruption in the case reported and to afford almost immediate relief by the application of 10 per cent cocain to the nasal ganglion.

Case: M. K., housewife, age 34 years, began complaining nine years ago of repeated attacks of otalgia associated with badly diseased tonsils. She had her tonsils removed five years ago and since then developed persistent itching in the ears and a typical nasal ganglion neuralgia. She had a sensation of dryness in the nose and throat, pain deep in the eyes, at the root of the nose, headache, mastoidalgia, and pain extending into the muscles of the neck and shoulder. During the last year she began having pains in both maxillary regions and on the advice of her dentist had all of her teeth extracted. The maxillary pains, however, continued just the same. She then developed a choking sensation in the throat as though a foreign body were present.

Nasal examination revealed a mild atrophic rhinitis and posterior ethmoiditis.

Considering the nasal ganglion symptoms I cocainized both ganglions and in a few minutes the entire neuralgic picture cleared up and the itching stopped completely. Under this nasal ganglion treatment she had improved rapidly, the choking sensation in the throat and the head and neck pains disappearing almost completely.

On Nov. 29, five weeks from the day she first applied for treatment, at about 2 o'clock in the afternoon she took sick with headache, weakness and lancinating pain in the right ear, radiating outwards to the auricle. In addition the entire nasal ganglion neuralgia recurred with unusual severity. Examination of the right ear that evening showed the drum membrane diffusely reddened, slightly swollen, the short process of the malleus, however, still visible. The medial third of the external auditory meatus was also swollen and reddened. While examining the ear with the Zeiss enlarging lens I suddenly observed the formation of three distinct vesicles on the

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*Reported from the Research Club of New York Post-Graduate Hospital, Department of Otology.

posterior half of the drum membrane and two on the anterior wall of the external auditory canal near the isthmus. The contents of the vesicles, at first clear, soon became turbid. During this time the patient complained of intense pain in the right ear. The left ear remained unaffected. The application of 10 per cent cocain to the right nasal ganglion relieved the pain completely in a few minutes.

The next day, the drum showed the vesicles greenish, surrounded by a zone of redness, the drum and canal still remaining swollen in the vicinity of the pustules. On the third day, the pustules appeared dried on the drum and canal with a zone of redness surrounding them, somewhat less distinct. The drum had regained some of its lustre anteriorly. It was at this stage that the case was demonstrated at the New York Clinical Society. On the fourth day the patient began complaining of noises in the ear and impairment of hearing. Functional testing at the onset of the attack showed a normal ear, on the fourth day, however, Weber's test localized to the right, Rinne was positive, Schwabach diminished. The watch was heard 10 c.ms. on the right and 1 m. on the left. The patient complained of slight dizziness, but not the typical labyrinthian dizziness. The drum membrane and canal showed circumscribed superficial ulcerations at the site of the pustules.

Her previous history showed that she had typhoid fever fourteen years ago, pneumonia eight years ago, influenza the year later, and following this rheumatism of the wrists and finger joints. Two years ago she had an attack of pain in the right shoulder, followed by an eruption of vesicles which became purulent and then cleared up. She got a similar attack on the left shoulder several weeks later. This attack from its history is suggestive of herpes zoster.

The differential diagnosis in this case is between myringitis bullosa, eczema and herpes. The vesical formation and involvement of the canal was not characteristic of myringitis. The short duration and neuralgic picture is also not that of eczema. The involvement of the medial portion of the canal exclusively would tend to rule out a furunculosis which generally affects the outer portion of the meatus. It was also important in the early stage of the case to exclude acute otitis and thus avoid an unnecessary paracentesis and a resultant acute otitis. This I did chiefly on the functional test showing a practically unimpaired middle ear, the retention of some of the drum details and the appearance of the vesicles.

It was very interesting to note that the pains of the herpes zoster oticus could be relieved by cocainization of the sphenopalatine (nasal) ganglion.

351 West 86th St.

DACRYOSTENOSIS FOLLOWING OZENA OPERATION AND ITS CURE.

Dr. J. Maliniak, Cincinnati.

Numerous surgical methods have lately been described for the radical cure of atrophic rhinitis with ozena. Some of them have an experience of many years of observation, as the methods of Halle and Lautenschläger.

On twenty operations which were performed by me in ozena, seven cases are still under my observation with eighteen months to two years since the operation. A detailed report on this work will follow soon.

Here, I want only to discuss an annoying complication for the surgeon and patient which may follow this operation, namely, the injury of the nasal lachrymal duct. No surgical technic designed to relieve a disease can be acceptable if possibly followed by another trouble not less pronounced than the first. This complication is not equally incident to the different methods used at the present time. Methods which consist in narrowing of the nasal fossae by infraction and mobilization of the lateral nasal walls, are particularly susceptible to this injury. As these methods are also far from the best for the cure of ozena, one has to be especially careful in their adoption.

The following history of a patient, operated for an atrophic rhinitis with ozena by two different methods, is particularly interesting from this point of view.

Miss B. H., age 21 years, had been treated for many years for atrophic rhinitis with ozena. At the age of eight, the patient was already regularly attended by a physician for her nasal troubles, which consisted in crust formation and bad odor. The Wassermann test was negative. Treatment by profuse nasal lavage and the application of the entire medical arsenal generally in use in ozena continued until 1922.

In January, 1922, a double ethmoid operation had been performed without any improvement.

In November, 1922, an ozena operation, by Halle's method, was performed on the left side, and the following day after the operation the eye on the same side started to lachrymate.

In March, 1923 (five months after the last operation), I saw the patient for the first time. The left nasal fossa (operated by Halle's

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method)[3] was quite narrow with a hyperemic inferior turbinate close to the septum. Accumulation of crusts in the posterior part of the nose behind the narrowed space, especially in the spheno-ethmoidal region, persisted. Epiphora without dacryocstitis was present.

The right side was wide with atrophic turbinates covered by a gray, dirty mucous membrane with large crusts in the nasal cavity, and a marked odor.

In April, 1923, I performed a modified Lautenschläger operation[5] on the right side with bone transplantation. Six weeks later I closed the epidermized antrum cavity. The result was very satisfactory, as crusts and odor disappeared and the nasal cavity remained narrow and covered by a healthy looking mucous membrane (eighteen months after the operation).

In July, 1923, as crusts continued to form on the left side (previously operated by Halle's method) in the middle meatus and in the spheno-ethmoidal region, I performed a curettage of the antrum, ethmoid and sphenoid. A wide communication of the antrum with the nasal cavity was established in the middle meatus and the ethmoidal wall was pushed toward the septum. No transplantation of bone in the lower part of the nose was necessary, as the narrowing of this region by the previous Halle operation was satisfactory. The antrum contained an evidently diseased mucous membrane, and similar conditions were found in the sphenoid. The ethmoid was sclerotic. The local conditions were greatly improved after this operation.

Eye Complication. However, the patient continued to be treated by an ophthalmologist for her chronic dacryocystitis on the left side, which seemed to progress.

In January, 1924, the ocular conditions became worse and a phlegmon of the sac appeared, requiring repeated incisions. A radical intervention was postponed until the phenomena of peridacryocystitis should subside. In spite of the most skilful care received by the patient from the oculist, in September fistulization of the tear sac occurred. Because of the abnormal nasal condition (ozena of long duration and numerous nasal operations), the endonasal tear sac operation seemed not to be indicated. On the other hand, an external operation was not possible in view of the extensive chronic inflammation of the region, with suspected pathology of the underlying bone. At the request of the oculist, the endonasal opening of the sac was decided upon and I performed this operation Sept. 19, 1924. All symptoms, such as epiphora, swelling and fistulization, disappeared entirely during the first days after the operation, and the patient could

be finally considered as cured of her atrophic rhinitis as well as of dacryocystitis.

Anatomical Considerations. The intimate anatomotopographical relations of the lachrymal apparatus with the nasal fossae make us understand the danger of the injury of the lachrymal duct during some ozena operations. It explains also why the endonasal opening of the lachrymal sac is the most logical procedure in case of dacryostenosis.

The lachrymal sac and duct can be considered as a unique-canal whose upper blind part (the sac) is located in the lachrymal fossa and the lower part (duct) in a bony canal, which opens in the anterior part of the inferior meatus.

The sac is continued into the nasal lachrymal duct without any demarcation. It is about 12 m.m. in length with a diameter of 5 m.m.

The lachrymal duct is situated in the inner antral wall, throughout the extent of the middle meatus. It has a length of about 15 m.m., with a diameter of about 4 m.m. The duct penetrates the nasal mucous membrane of the inferior meatus obliquely for a short distance, forming a valvular fold.

The lachrymal fossa, where the sac is located, is formed anteriorly by the resistent frontal process of the maxilla, the posterior portion being formed by the thin lachrymal bone.

One or the other of these bones can predominate in the formation of the lachrymal fossa, which explains the more or less pronounced resistance offered to the chisel in the removal of these bones during the endonasal tear sac operation.

By looking into the nasal fossae, one notices on the lateral wall, under the insertion of the middle turbinate and in front of the unciform process, a protuberance named by Kopsch, as Torus Lachrymalis. This space corresponds to the location of the sac and is a very important landmark for the endonasal opening of the sac. The windows in the mucous membrane and bone should be made in this place. Ordinarily bulging in the nasal cavity, the torus lachrymalis can also be flat or even concave, in which case the window formation will be more laborious.

Surgical Methods Used for Ozena Cure. Let us see to what degree these anatomical points are taken into consideration in the different surgical methods proposed for the cure of ozena. Three groups of operations are actually used for this end.

1. Narrowing of the nasal fossae by submucous transplantation of fat, bone, mucous membrane of cartilage into the septum, nasal

floor or lateral wall of the inferior meatus: (methods of Brünings,[1] Freudenthal,[2] Pollock,[7] etc.). Narrowing by submucous paraffin injections (Moore).[6] The sinuses in these methods are not treated.

2. Narrowing of the nasal fossae by submucous transplantation in the nasal floor and lateral wall of the inferior meatus of bone or cartilage. This part of the operation is preceeded by a radical cleaning of the antrum, ethmoid and also sphenoid cavity, if the latter is diseased. (New Lautenschläger method.)[5]

3. Narrowing of the nasal fossae by mobilization of the lateral walls preceded by endonasal (Halle's method)[3] or transbuccal curettage of the antrum and ethmoid. (Methods of Seiffert,[9] Hinsberg,[4] Ramadier,[8] etc.)

The injury of the nasal lachrymal duct in the first two groups of operations has to be rather exceptional, as no mobilization of the lateral walls takes place. The infection of the duct is, nevertheless, possible as a result of injury of the mucous membrane in the inferior meatus near the ostium, or by continuity of the infection from the transplant.

The narrowing is accomplished in the new Lautenschlager operation by submucous transplantation of bone or cartilage in the floor of the inferior meatus, and in the upper part in the region of the middle meatus, it is done by inward mobilization of the upper and posterior part of the lateral wall. The injury of the duct is scarcely possible during these manipulations, as the bony canal of the duct lies more anteriorly in the maxillary bone, as mentioned above.

The injury of the duct is, however, possible during the curettage of the antrum. This may happen by forcible application of the curette in the prelachrymal recess. This risk is, thereby, the same as in any radical antrum operation. Koffler, Lieblon and Hajek have published cases with injury of the nasal lachrymal canal following antrum operation. Some rhinologists to avoid this complication, remove in this surgical intervention, only the lower part of the bony lateral wall of the inferior meatus.

Halle's operation for ozena consists in displacing the anterior wall of the nose inwards by endonasal manipulations: The mucous membrane incision extends from the anterior end of the middle to the anterior end of the inferior turbinate and across the floor to the septum. The bone is chiseled along the vertical incision and then backwards at its upper and lower end. With a strong elevator, the loosened wall is pushed inwards towards the septum, and adhesions between the septum and the inferior turbinate are established.

The chiseling of the thin wall is nearly always accompanied by bony fissures. Very often the mobilized wall is divided in numerous fragments dependent upon the strength and direction of the chiseling, as also upon the density of the bone. As the ostium of the nasal lachrymal duct is located at a distance of only a few millimeters from the line of chiseling, we may well be astonished not to find more often an injury of the lachrymal duct.

Seiffert, Hinsberg, Ramadier and others mobilize the lateral nasal walls after the antrum has been opened through the canine fossa. While Hinsberg mobilizes the walls by cuts made in the inner antral wall, below through the pyriform fossa, and above through the nasal process of the maxilla, the others leave the process pyriformis in place and chisel in the wall right behind it. The mobilized walls are fixed in place with silk or wire, anchoring them to the septum.

In practicing Seiffert's method, I have always seen the mobilized walls fragmented. The latter healed nicely, being covered by the periosteum on their inside, but the extreme fragmentation of the nasal wall will always militate against the safety of the lachrymal duct, and in reality we have met this complication.

In my twenty ozena operations performed during the last two and one-half years, I have not met with this accident, since I did not mobilize the nasal walls.

In case of injury of the lachrymal duct, the method of choice for re-establishing the permeability of the lachrymal apparatus will be the endonasal opening of the sac.

The only contraindication for this operation is the stenosis of both canaliculae.

After Kuhnt, 93.7 per cent of diseases of the lachrymal apparatus are of rhinological origin. Adopting the endonasal tear sac operation we perform the causal treatment, which is the most logical.

The method of Toti presents an advantage to ophthalmologists as it is performed by the external route.

According to Toti,[10] his operation is successful in 50 per cent of cases. The closure by granulations and the removal of the muscular apparatus of the sac seems to be the cause of the failures.

The Polyak-West operation, which is now universally adopted, consists in the endonasal opening of the lachrymal sac and establishment of physiological conditions in the lachrymal apparatus, as the strictures are nearly always located below the sac. According to West, this operation is successful in 90 per cent of cases. Its technic is generally known and we want to discuss here only some of its important points.

1. In the flap formation, the lower incision has to be made under the apertura pyriforms which being uncovered gives a much wider view of the operative region.

2. The window formation in the mucous membrane flap has to be made at the end of the operation according to the size and shape of the bony window.

3. The latter must be high enough to allow a probe to be introduced through the lower canalicule to be seen free in the nasal cavity in a horizontal position.

4. The sac has to be opened widely to avoid the possibility of a secondary closure. One centimeter in length and 5 m.m. in width of the sac has to be removed.

5. The flap formation will be fixed by two catgut stitches at the lower edge to avoid its shifting during the after treatment.

6. The packing, which maintains the mucous membrane flap, will remain in place for seven days. The day after the operation the sac is washed through the lower canalicule with a 2 per cent boric acid solution and the same is done the following days for one week.

CONCLUSIONS.

1. Some of the new surgical methods practiced for the cure of ozena endanger the integrity of the lachrymal duct.

2. This is due to the close topographical relations of the lachrymal apparatus with the nasal fossae.

3. Methods in which the lateral nasal walls are infractured and mobilized are particularly dangerous.

4. Methods in which the narrowing of the nasal fossae is performed by submucous transplantation of bone or cartilage are entirely safe in this respect.

5. The endonasal tear sac operation gives the best results in cases of dacryostenosis. It is not contraindicated in infected nasal fossae.

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47 Groton Building.

URTICARIA OF THE LARYNX.*

Dr. Samuel Cohen, Philadelphia.

Although about twenty-five cases of urticaria of the larynx have been reported in literature, its frequency is far greater than we would be led to believe. It is occasionally seen following the administration of a serum or vaccine. Dr. F. O. Lewis has seen a case following the administration of vaccine for hay-fever. Freudenthal believes that the condition occurs rather frequently. Sequi reports it as occasionally seen following excessive doses of K. I. and gives as the causes injury to the larynx, kidney disease, syphilis, etc. He suggests as treatment opiates and rest, ice or heat appications, and cocain spray in the larynx. Tracheotomy may be necessary, and he suggests the intercricothyroid route. Lederman reports a case of fracture of the larynx and the entrance of air into the tissues of the neck (emphysema) and when this cleared up edema of the larynx was noted.

Dr. B., into whom I had injected 20 c.c. of horse serum, was brought to my office one evening (eight days after the injection) with marked difficulty in breathing. On obtaining a history of previous attacks of urticaria, I assumed that his difficulty in breathing was due to laryngeal urticaria setting in. Adrenalin solution used hyperdermically quickly relieved his laryngeal difficulty, but the following day showed a very profuse and severe case of skin urticaria, his entire body at one time or another was completely covered. This is the usual laryngeal urticaria met with, and seen rather frequently.

The case I wish to report more in detail here, however, is very unusual in that the laryngeal condition existed for six days, a fatal ending having been expected, and then the skin manifestations of urticaria were noted and that very mildly.

I was called in very hurriedly by Dr. A. to see Mrs. A., age 60 years, last New ear's eve, found the patient in bed, mouth open, labored breathing. In attempting to answer questions patient spoke indistinctly and in a whisper. Dr. A. told me she had three physicians before him, and that a fatal end was predicted, but as a last resort another laryngologist was called in. (Tuberculosis of the larynx had been diagnosed.)

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Besides an occasional attack of bronchitis and some of the ordinary ailments of childhood, her previous health has been remarkably good. The present illness began five days ago, breathing becoming gradually worse, and for the past twenty-four hours unable to swallow even liquids. Heart, lungs and kidney reported by the attending physician as normal. My examinaton revealed scalp, eyes, and ears normal. Teeth poorly kept, tongue clean. Soft palate congested, pharynx and peritonsillar structures deep red. Larynx and epiglottis edematous, especially marked on laryngeal surface, both arytenoids markedly edematous, and occasionally a narrow slit could be made out in the anterior segment of the glottis.

Fearing the possible need of an emergency tracheotomy, I admitted the patient at once to the Howard Hospital, service of Dr. G. B. Wood. I suspected a possible suppurative process in larynx or pharynx. Saw the patient at the hospital at 1 a. m. and sprayed her larynx with adrenalin chlorid solution 1/1000; this was followed in a few minutes by a remarkable relief. At 3 a. m. I again sprayed the larynx. The breathing was distinctly easier and she was able to swallow water.

Next morning, Jan. 1, 1924, found the patient cheerful, swelling of the arytenoids distinctly less, and a view of the interior larynx was obtained, and again sprayed the larynx with adrenalin chlorid solution. That evening the patient complained of itching, and examination revealed urticarial wheals over various parts of the body. The hypodermic use of adrenalin m.5, was ordered repeated if necessary. Next day larynx clear, general urticaria gone, but pharynx and peritonsillar tissue still red. This deep congestion was thought by some of my colleagues to be masking pus beneath it in the left pharyngeal wall, and to satisfy ourselves, a knife was inserted and nothing obtained.

This case is of interest for several reasons: *1* Very few cases of laryngeal urticaria have been reported, but I believe it is more frequent than we imagine. *2* Because of the marked beneficial effect obtained by the use of adrenalin chlorid spray in the larynx, *3*, Because of the rarity of an attack of laryngeal urticaria lasting six days and then followed by the skin eruption. *4* Because of the confusion in the diagnosis, as we have here catarrhal process upon which has been superimposed the laryngeal urticaria.

2009 Pine street.

IDIOPATHIC ABSCESS OF THE LARYNX.*

Dr. Samuel Cohen, Philadelphia.

The condition is of interest because of its infrequence, and its rather high mortality when not incised early.

The first case was reported by Roland in the thirteenth century. Morrel McKenzie in his textbook reports thirteen cases, but cannot demonstrate any local or general cause. All his cases were cured either by spontaneous rupture or the surgeon's knife. Laennec reported two cases, both ending fatally, and on postmortem no cartilaginous involvement could be found. Richards collected twenty-six cases of idiopathic laryngeal abscess, and his paper is most interesting.

Richards' cases range from 9 to 71 years of age. They were most frequent in males than in females. In children he believes the infectious diseases play a causative role. In adults, exposure to cold and wet, he regards as an etiologic factor. Ten of his cases were treated by nonsurgical methods, and all died but one. The balance had operative intervention and almost all recovered. In five cases that ruptured spontaneously, one died and that one had a tracheotomy performed, which was soon followed by bronchopneumonia and death.

Dr. Thomas reports an interesting case of a child, age 3½ years, whose laryngeal abscess was only discovered when a drachm of pus was coughed up after the insertion of an intubation tube, to relieve difficulties in what was thought to be a case of croup. After a very stormy siege the patient recovered.

Dr. McDonald reports the case of a woman, age 40 years, who had a right-sided laryngeal abscess for eighteen months before symptoms warranting incision set in.

The symptoms differ, depending upon whether occurring in a child or in an adult. In children it is ushered in like an attack of croup, only more insidious in onset, gradually developing marked dyspnea, and dysphagia. Expiration is comparatively easy and the cough much less brassy. On attempting the recumbent position an increase in dyspnea is noticed. The condition can most easily be confused with a retropharyngeal abscess. In adults it may be ushered in without any symptom referable to the larynx at all. Dr. Richards reported one case where the patient had a slight dyspnea for two days, which suddenly increased, with the patient's exit that same evening. In

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another one of his cases the patient merely complained of a slight pain in the throat, took a short walk and suddenly died.

Dyspnea was frequent in most of Dr. Richards' cases. Dysphagia in about one-half the cases. Pain occurred even on swallowing saliva. This, McDonald points out as more frequently noted in a laryngeal case than a pharyngeal one. Stridulous breathing and occasionally cyanosis are met with.

Tenderness on slight pressure over the larynx is seen, but an external swelling is rather rare. Occasionally symptoms pointing to the larynx are not complained of at all, and the abscess is found only after careful study or accidentally.

In indirect or direct laryngoscopy a mass is seen. The mass is usually noted at the base of the epiglottis, more to one side. The swelling is usually more hyperemic than the already congested surrounding mucosa. At some point a small yellow spot is often seen denoting purulent secretion attempting to escape. On palpation, by probe or finger, this mass is usually fluctuating.

Cysts may be confused with this condition, but are much paler, far less painful, and much longer duration.

New growths can be differentiated by the general history, site, appearance, probing, etc.

Abscesses due to perichondritis or chondritis will be differentiated by the history of T. B., syphilis, etc.

Treatment as soon as the diagnosis is made, the presence of pus almost certain, incision is immediately indicated.

In children this must be done quickly and carefully. A tracheotomy outfit should always be on hand ready for a possible emergency. After incision, the head should very quickly be brought downward and forward, to prevent the entrance of pus into the larynx. "Watchful waiting" is not the best treatment.

Cold or hot compresses, steam inhalations, purgatives, diuretics and diaphoretics are worthy adjuncts, but not substitutes for the knife.

Mrs. S. W., age 50 years, first complained of a pain in the throat on Aug. 3, 1922. Gradually her throat became clogged until difficulty in breathing set in. I was called in consultation by Dr. G. to the patient's home on Aug. 19, 1922, and found her in a semirecumbent position, with dyspnea a marked symptom.

F. H. negative. P. M. H. had most of the diseases of childhood: ten children, no miscarriages. For the past ten years has been complaining of pains and aches over the entire body.

Examination: A rather stout, middle-aged woman. Heart and lungs were normal. Some fullness and tenderness of the left side of

neck extending to the midline. Teeth, marked pyorrhea. Tongue, center coated white, edges congested. Throat, entire pharynx, soft palate, and tonsillar area deeply congested. Epiglottis deep red in color and thickened; at its base more toward the left side, a swelling is seen about 1 in. in diameter, granular in appearance, and a yellow spot about ½ in. from the epiglottis. Both arytenoids are swollen, the left merges into the mass. The right cord is visible, left not visible, hidden by the mass. A glimpse of the tracheal mucosa shows marked congestion.

While probing the mass the abscess ruptured with hawking up of about a drachm of pus, and with great relief to the patient. Fearing closure and refilling of the abscess, I advised the patient's removal to the hospital for closer observation and treatment, requesting my interne to be in readiness for an emergency tracheotomy. I left town that same evening, leaving my friend Dr. Gleason in charge of the case. He saw the patient that evening and the next day, and reported to me on my return, Monday morning, Aug. 21, by phone, that the patient was doing well. The same day, Aug. 21, 1 p. m., I saw the patient and found she desired more sleep than one would expect, but attributed her sleepiness to the spiritus frumenti she was taking, which was ordered stopped. Report of the urine showed nothing out of the ordinary, no casts, no albumen, no acetone or diacetic acid, and I thought my patient should recover. That same evening I found my patient becoming comatose, and not finding anything in the larynx in explanation, I called Dr. S. A. Loewenberg, who suggested the possibility of it being diabetic coma, and ordered a blood sugar examination (in spite of the negative urinalysis) this was found far in excess of normal. Active treatment for diabetic coma was instituted at once. Next urinalysis report showed the presence of sugar, acetone, and diacetic acid. The patient, however, continued in a state of coma for two days, dying on the evening of Aug. 23, 1922.

This case is of interest because of: *1* Its rarity; *2* the underlying predisposing cause of the abscess was diabetes.

2009 Pine Street.

ACTINOMYCOSIS OF THE TONGUE.*

Dr. R. A. Barlow, Madison, Wisc.

Actinomycosis is frequently encountered in cattle and hogs, and its existence is known to every farmer and dairy man under the name of "lumpy jaw". Man in his closer relationship to animals, especially if he is treating cattle, may develop the disease. Patients who come from dairy and cattle communities should always be regarded as possible victims of the condition.

The tongue is a very rare site of actinomycosis, because it is composed of little cellular tissue on which the ray-fungus grows best, and is protected by a thick epithelial covering. New and Figi, at the Mayo Clinic, reported 107 cases of actinomycosis of the head and neck. In only six of these cases was the tongue primarily involved. The same writers, in reviewing the literature, bring out the fact that previous observers, Illich, Ruhrah, Krymow, and others, had found that out of 1775 cases of actinomycosis there were thirty-five cases primary in the tongue. Grupen reports a case and remarks that 50,000 patients passed through the Kreiskrankenhause before this case was happened upon. The growth was excised, but it was not until the pathologist had made his examination that the diagnosis of actinomycosis was made. This, in view of the fact that the hospital was situated in the midst of an agricultural community makes one suspect that many other cases went by unrecognized. Grupen's case, with others reported in the literature, and my case make a total of forty-three cases. There are many other cases of actinomycosis of the tongue by direct extension.

Bonnet states that the virulence of the fungus decreases in the passage of actinomyocis from animal to man and that it increases again on grains. It has also been noticed that cases of actinomycosis preponderate in sections where the weather is rainy and humid, as dampness seems to favor its development.

Actinomycosis can be found at any time in the beards of grains, and observations of the crypt contents of the tonsils of slaughtered hogs show that the ray-fungus is a constant finding there also.

Many cases of actinomycosis of the tongue in man are associated with the presence of foreign bodies, such as grain beards. Although the disease in man is most commonly found in persons connected with farming and the cattle industry, New reports the case of a judge who was in the habit of chewing grass while playing golf.

The patient usually presents himself because of a swelling or well localized nodule in the tongue. As a rule the condition is of long

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standing, even four or five months; the symptoms are not marked and are not severe. The symptoms of soreness and slight immobility are most noticeable at first, and these increase as the tumor or nodule becomes more prominent. It is from this feeling of stiffness that the name "wooden-tongue" has been derived. Although a few patients complain of intense pain, it is a very rare accompaniment of the condition even on mastication. There is no fever or general impairment of health, and the course of the disease is essentially chronic.

The actinomycotic nodule is usually located well in the anterior portion of the tongue, and the patient can generally recall some injury, either produced by a foreign body or irritation of a ragged tooth. The nodule is indurated and tender, and the mucous membrane is tense over the area much as though it were stretched over a foreign body. Lymphatic enlargement is not characteristic. There is marked irritation in the tissues associated with proliferation of fixed cells. The mass increases in size at the expense of the muscles, which atrophy, and there is a decided increase in rose color of the fibers in proximity to the nodule. The vessels also show evidence of granular degeneration with thickening, and the fibers of muscle tissue in the neighborhood lose their striations.

The abscess itself is cellular and contains some white globules. Centrally may be seen the yellow or so-called sulphur bodies. Occasionally, the nodule will rupture spontaneously and evacuate a foul-smelling, bloody fluid in which may be seen the sulphur bodies.

The salient points in diagnosis are a history of chewing grain beards or grasses, or caring for animals with the disease, a chronic course and lack of general lymphatic involvement. Incision of the nodule and recognition of the sulphur bodies and ray-fungus under the microscope verify the diagnosis.

The treatment which yields best results is a combination of a local surgical measure, that is, incision and drainage, administration of potassium iodid internally, and application of copper sulphate to the incision. In addition, the application of radium to the nodule hastens softening and resolution, and facilitates the elaboration of the potassium iodid. Some English writers advise the use of an organic iodin salt. Potassium iodid has been the standard treatment since Thomassen first used it in 1885. The wound may also be swabbed with silver nitrate solution or the actual lunar caustic bead.

The results of treatment are satisfactory when the disease is recognized before multiple abscesses have developed and when the nodule is not too deeply seated near the base of the tongue. The patient should report for observation at intervals, because there may

be a tendency for recurrence, unless all the pockets in the nodule are clean.

The invasion of the ray-fungus may become very extensive and involve other tissues. The discharge may be aspirated and pulmonary involvement may ensue, which, of course, would alter the prognostic phase of the malady.

REPORT OF CASE.

Case 40748. Mr. F. R. came to the Jackson Clinic, June 18, 1924, and was examined by Dr. J. A. Jackson. The patient was a farmer, age 35 years. The family history was negative and the man himself had been in good health until five months previously. He had first noticed a soreness in the tongue and a nodular swelling on the dorsum at the junction of the anterior and middle third. One month after the appearance of the lump it suddenly ruptured; he expectorated a drahm of foul-smelling material and the tongue felt more normal. In a few days the induration was again noticed, accompanied by difficulty in manipulating food in the mouth. From this time on the nodule increased in size, and about every three or four weeks ruptured spontaneously.

June 19, the nodule was incised and foul, bloody pus containing sulphur bodies was evacuated. Microscopic examination of the exudate revealed the ray-fungus. The patient was given potassium iodid, xv gr., three times daily and copper sulphate, ¼ gr., three times daily. The wound was treated with copper sulphate, silver nitrate solution and caustic bead.

In four weeks the nodule had entirely disappeared and at the last examination, five months later, had not returned.

SUMMARY.

Actinomycosis of the tongue is a condition which is frequently overlooked but whose existence should constantly be suspected in persons who engage in dairy and agricultural pursuits.

Early recognition with surgical drainage and active postoperative care are attended by satisfactory results. Failure to recognize this condition is almost certain to result in most serious consequences, even to the point of jeopardizing the life of the patient.

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THE NECESSITY OF SPEECH AND VOICE RE-EDUCATION, WITH SPECIAL REFERENCE TO NASALITY.

MABEL FARRINGTON GIFFORD, San Francisco.

Speech and voice re-education are as yet in their infancy in the United States. Speech re-education—and by speech we mean the shaping of voice into the consonant and vowel sounds which constitute language—is now being recognized as a necessary adjunct to oral and nasal surgery, especially in Austria. Voice re-education, defining voice as the fabric of which speech is built, that is, sound made by breathing out with the vocal cords so set that they vibrate, is as yet sadly neglected; yet there are various forms of nasality which require the re-education of voice production for their cure.

The subject of nasality has been thoroughly studied by the Germans. The ideas of Dr. Wm. Stern and Dr. Emil Fröschels along this line form the basis of my discussion.

Nasality is a voice defect caused by an abnormal condition or action of the palate, or by an obstruction. In order to make the matter clear let us briefly describe the normal action of the palate in voice formation. In the formation of all sounds of the English language, with the exception only of the nasal sounds m, n and ng, the nasal cavity is separated from the buccal cavity by the elevation of the palate and by the formation of what is known as Passavant's cushion, this latter arising through the contraction of the upper part of the superior pharyngeal muscle and its approximation to the soft palate. Normally this closure is not absolutely air-tight, for the euphony of speech is dependent upon the slight vibration of a current of air in the nose. Every deviation from this palate action, which brings in its train a lack of nasal resonance, causes an abnormal voice condition commonly known as nasality, and which may be divided into three main groups: *1*, open nasality; *2*, closed nasality; *3*, mixed nasality.

Open Nasality: That condition which exists whenever a quantity of air streams into the nose on account of the presence of an abnormal opening (with the exception, of course, of the formation of the nasal sounds m, n and ng) is designated as open nasality. Thus it is caused by a pathological communication between the mouth and the nasal cavity. This pathological communication may exist in the

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region of the hard as well as of the soft palate. An acoustic example of open nasality is the pronunciation of the word "man" as it is done in French.

a. Organic. Open nasality is organic when based upon varyingly severe forms of cleft palate, congenital defects of the palate, perforations of the palate due to lues or tumors, adenoids which hinder the mobility of the palate, or after diphtheria. It may exist through congenital weakness of the articulation muscles, as often found in idiots or imbeciles. Open nasality may be proved if, by alternately holding a patient's nose open or closed while he says "a", there is an appreciable change in tone. There is no change in tone with closed nasality.

b. Congenital. *1* Congenital: no actual paralysis of the velum, but the velum is not used in speech coordination.

2 Acquired: imitation by normal children of the talk of children with cleft palate.

3 Post-operative: cases of injury to the soft parts following adenoid operations. Also cases where patients have forgotten the use of the velum due to pre-operative presence of adenoids with the resulting obstruction. This latter condition may be corrected with exercises.

4 Post-diphtheritic, pseudo-bulbar, paralysis, brain tumors. These cases are those in which paralysis of the palate arises following the diseases mentioned, and where the patient, even after restoration of the velum movement does not use it on account of his nasality habit. Open organic nasality thus becomes open functional nasality.

5 Nasality as found in the hard of hearing also belongs to this group.

Closed Nasality: Closed nasality is a condition brought about by growths in the nasal cavity or in the nasopharynx so that nasal sounds cannot vibrate in the nose. When nasal resonance is lacking (whether in voiced mouth sounds and vowels or in nasal sounds) the resulting speech is "stopped-up" and hollow, or "dead", the stopped-up condition being an indication of what is known as anterior nasality; the dead voice, that of posterior nasality. Thus closed nasality may be divided into:

a, Anterior; b, Posterior; c, Palate.

In closed anterior nasality the site of the obstruction is in the nasal cavity, and the obstruction must be removed by operation. The voice has a hollow sound, and the cause thereof lies in the form of polyps, growths, adenoids, marked deflections of the septum or perhaps only in the presence of a fresh cold.

Examination discloses as a cause for closed posterior nasality the presence of adenoids or polyps or possibly adhesions of the soft palate to the posterior pharyngeal wall. Thus the obstruction in the case of posterior closed nasality lies in the nasopharyngeal space. Operation is indicated for this condition.

Cases of "dead" voice have been found to exist without the presence of obstruction in the nasopharynx. This condition which is called closed palate nasality must then be attributed to a cramp-like action of the soft palate by means of which this latter rises during speech and causes a complete air-tight closure between the nasal and the buccal cavity. We know that resonance and euphony derive their essence from the lack of air-tightness between the two cavities. Impervious closure causes the nasal sounds, m, n and ng also to be formed in the mouth, and as a result m becomes b, n becomes d, ng becomes g. Consequently in cases of "dead" voice the mouth sounds lose their musical quality.

How can we differentiate between these different forms of closed nasality? We must determine whether the defect lies in the nose proper, in the nasopharynx or in the palate. This is no easy matter for the differentiation according to sound is difficult, and the correct group classification should not be considered final until both the nose and the nasopharyngeal space have been examined, and the correct and normal motion of the palate has been ascertained. In cases where there are obstructions both in the anterior and posterior sections, or one or the other condition exists accompanied by the adhesions of the palate to the pharyngeal wall, or possibly where all three conditions exist, it is not possible to make a positive diagnosis. The wisest procedure in such cases is first the surgical removal of the largest obstruction. If after a proper length of time the voice condition is still nasal, the next largest defect must be attacked, and so on until the actual cause or causes are found.

Dr. Fröschels has a method of differentiation between posterior closed nasality due to growths, and palate nasality. He introduces an ear catheter or some similarly shaped sound through the lower nasal passages up to the palate. While the patient is saying the word "name", for instance, he presses down upon the soft palate with the sound. In the cases of posterior closed nasality there is no difference in tone, as the air originally had no trouble in passing the palate, and was not hindered until later in its further passage. This method is valuable as an indication for operation. Operation is only justifiable in cases of growths, etc. Palate nasality requires drill and exercise of the palate.

Mixed Nasality: When along with a pathological communication between mouth and nose (open nasality) there exist equally marked defects in nose and nasopharynx (closed nasality), we have mixed nasality.

a. Anterior. Here we have a stopped-up nose, or an open closure of the velum, as often found in congenital cleft palates. Operation if done must be done with very great care, else the voice is made worse.

b. Posterior. The presence of adenoids, open velum closure are likewise found in congenital cleft palate and congenital defects of the velum. Dr. Gutzmann suggests the removal of adenoids.

Between all these forms there are a number of borderline and mixed forms.

Thus, to recapitulate, the following cases require voice re-education:

Open Nasality: a. organic. Much can be done with speech and voice re-education in cases of cleft palate, congenital defects of the palate, and in certain types of perforations of the palate if the proper dental appliance, consisting of a combination of hard and soft palate, fitted in like a plate, and suited, of course, to the needs of the individual, is used. I have found from my experience that speech re-education is productive of better results in such cases than in cases which have been operated upon. In the case of the dental method of treatment the muscles are more flexible and adjust themselves more freely to the new apparatus. However, in all cases of cleft palate, whether treated operatively or by the dental method suggested, speech re-education is necessary to finish off the treatment.

Congenital weakness of the articulation muscles can be strengthened by exercises, provided that the patient's mentality is sufficiently normal.

b. Functional. *1* Congenital—can be corrected by exercises. *2* Acquired—can be corrected by exercises. *3* Cases where patients have forgotten the use of the velum due to pre-operative presence of adenoids. These patients can be cured by exercises. *4* Paralysis as the result of disease will or will not yield to exercises, depending upon its nature. Complete paralysis, of course, is hopeless, but partial paralysis can be treated and also paralysis which is the result of hysteria, that is, when the psychic factor has been cleared up.

In cases where the soft palate is not used on account of the nasality habit, the palate can regain its activity through exercises.

5 Nasality in the hard of hearing can also be improved through exercises.

Closed Nasality: Posterior functional can be corrected by exercises. Palate nasality can be corrected by exercises.

Mixed Nasality: In anterior mixed nasality, exercises will strengthen the palate.

Closed palate nasality is of special interest to Dr. Fröschels. Five cases are quoted.

1 Young man, age 21 years. Speech poor since eighth year. Nose had been operated upon three times for the removal of growths. The second and third operations had involved much loss of blood and for this reason plans for straightening the septum were not carried out.

Present condition: Patient spoke with a "dead" voice. Nose wide and free. Pressure upon the soft palate lightened the speech. At each opening of the mouth, whether with speech or not, the soft palate raised itself to its limit, so that the patient was not able to breathe through his nose with his mouth open.

Diagnosis: closed palate nasality. Treatment consisted in directions for his imitation of my speech, and in special practice of the nasal sounds, as follows: Dr. Fröschels introduced a gauze sponge into the patient's mouth, which was held wide open. This sponge made the penetration of air into his mouth impossible, so that he was obliged to breathe through his nose while his mouth was open. In that way the patient overcame the cramp-like motion of the palate, which occurred even without speech. Patient left after four months and could speak perfectly normally when he made the effort.

2 Workman, age 51 years. Had always spoken in a nasal tone. Never operated upon. Present condition: "dead" voice. Nose extraordinarily wide, no abnormality. Pressure upon the soft palate brought about normal tone. Diagnosis: closed palate nasality. Patient was not able to devote time to a cure.

3 Girl, age 17 years. Speech always poor. At the age of 5 had had operation for removal of growths from nasopharynx. Present status: "dead" voice. Nose normal. Pressure upon the soft palate produced a clear voice. Diagnosis: closed palate nasality. Therapy as in case No. 1, with a gauze sponge. Patient was cured after three months.

4 Boy, age 6 years. Speech always poor. Hearing poor. Present status: "dead" voice. Large adenoids, catarrh of the Eustachian tubes. Pressure upon the soft palate cleared the voice. Diagnosis: closed palate nasality plus closed posterior nasality. Therapy: removal of adenoids. Speech not improved. Child later given speech re-education lessons, which had been planned from the beginning.

5 Boy, age 15 years. Speech always poor. No operations. Present status: "dead" voice. Very large adenoids, especially to the left. Pressure upon the soft palate improved the voice. Diagnosis and therapy as in case No. 4.

The two last-named cases show a combination of a blocking of the nasopharyngeal space by adenoid growths, and a hyperactivity of the palate. In such cases the growths must be removed before speech re-education can be undertaken, and a cure entails both procedures. This must be made clear to parents in advance. Speech therapy should of course not be started until the patient has thoroughly recovered from the operation. Where there are moderate growths in the nose proper, accompanied by hyperactivity of the soft palate, speech therapy should be tried before operation. In the course of this therapy it can be soon ascertained whether the growths in the nose play a part in the poor speech.

In cases of adenoids or growths in the nasopharynx, operation is necessary because the normal function of the soft palate will never be attained as long as the patient cannot hear the difference between his speech with a contracted and a movable palate. As long as the nose is blocked, the difference in tone or sound between the wrong and the right use of the soft palate will not be heard. Dr. Gutzmann says besides, that adenoids are probably the cause for the hyperactivity of the palate, since the patient does not learn the value of the delicate movements of this organ, speaking as he does with a "stopped-up" nose. Dr. Liebmann says the same.

In regard to therapy in cases of palate nasality, Dr. Fröschels recommends the above exercises of breathing through the nose with the mouth wide open in all cases where the perverse action of the palate occurs when the mouth is opened independent of speech. This condition can be readily ascertained by asking the patient to inhale through the nose with his mouth wide open. If that causes him difficulty, then there is a stoppage causing a closure between the nose and the mouth, which, if there is no other pathology in the nose or in the nasopharynx, must be caused by the soft palate. Aside from the breathing exercises, the practice of nasal sounds can be used advantageously, according to Dr. Gutzmann. Another aid which he has found very worth while, is to practice the vowels with an "h" in front of them. In this way the vowels are pronounced with less pressure; that is, the palate is not so strongly contracted. For it is a matter of fact that the throat is less tense with a voiceless initial letter such as "h" preceding the vowels than if they were pronounced without it. The length of time necessary for treatment depends upon

the individual; however, two to three months at least should be counted upon.

CONCLUSION.

There is no reason why similar treatment for closed palate nasality and for all the enumerated cases calling for speech and voice re-education, should not become the customary thing in the United States. As stated before, cases operated on for adenoids or for cleft palate, where sufficient palate tissue remains for proper functioning to permit of voice and speech re-education, should be finished in this way. Parents as well as the medical profession do not seem to realize the great value, in fact the importance of speech re-education following such operations. Not only is the speech itself unnecessarily ugly without training, but it has its effect upon the future morale of the child, educationally, socially, and psychologically. Many children with neglected speech following operation become the target of ridicule and mimicry of their classmates with the result that their confidence and poise are destroyed and they retire into themselves, withdrawing more and more from society. A speech re-education follow-up would have rounded off an otherwise successful operation.

THE AMERICAN BOARD OF OTOLARYNGOLOGY.

The American Board of Otolaryngology will hold its first examination during the Meeting of the American Medical Association in Atlantic City, May 25 to 28.

According to the rules of the Board, applicants are divided into three classes.

Class I. Those who have practiced Otolaryngology ten years or more.

Class II. Those who have practiced Otolaryngology five years and less than ten years.

Class III. Those who have practiced Otolaryngology less than five years.

The type of examination is different for each class.

The Secretary, Dr. H. W. Loeb, announces that thus far over three hundred applications have been made.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

November 14, 1924.

The Petrous Pyramid; Its Surgical Anatomy and the Technique of the Operation for Its Removal, With Report of Cases. Dr. John D. Richards.

The object of the paper was to present such data as has been secured by operating upon eight cases for the removal of the petrous pyramid, either in whole or in part, and to discuss from a surgical standpoint certain anatomical features of the pyramid having a bearing upon the technique of the operation.

Three of the cases were malignant, having as far as could be determined, the middle ear as the original site of the lesion. These cases contributed no special features to the technique of the operation not embraced in the second group.

The second group consisted of five suppurative cases in which the extensive necrosis of the petrous was consecutive to mastoid and labyrinth suppuration. The outstanding feature in all these suppurative cases was the presence of a collection of pus at the posterior petrous plane, either in the meatus or adjacent to it; in four, the internal meatus was involved; in one it was not. The first case showed conclusively that the abscess may result from direct perforation by a suppurative process of the inner labyrinth wall; the other four pointed to the cochlea as the focus of infection. The anatomical structure and relations of the modiolus were described and its importance as a pathway of infection was stressed; also the effect of respiration upon the fluid column of the cerebrospinal axis in the dissemination of infection from the cochleal to the intracranial cavity, the statement being made that the modiolus, as an average for the distribution of infection to the interior of the skull, is the most important structure of the labyrinth, outranking all others in relation to the surgical anatomy of this region; the cochlea being the great distributing focus. The technique and rationale of the operation were discussed in detail, one of the most important points being to determine whether or not to save a facial arch for the facial nerve, the operation being made much more difficult if this attempt is made. The extent and character of the necrosis decides this question. The technique of any operation for this removal of the petrous pyramid must embrace in its connection something more than the ability of the operator to carve out a facial arch, avoid the internal meatus, and remove such portions of the pyramid as are diseased or dead. It must take into account the structural character of the pyramid, the nutrition of the bone and the nutritional changes which may take place subsequently in portions of healthy bone which are allowed to remain. Considerable emphasis was given to the role of the carotid artery in this operation.

In closing, the writer pointed out that the operation is one of magnitude—many vital structures lie across its path. The structure of the sclerotic portions of the petrous pyramid is treacherous and the bone often fractures in a manner which is incalculable; situations arise to make judgment difficult in the absence of experience. Long training in cadaver work is absolutely essential to the operator. The technique of the operation may vary from that presented in the paper, but enough is known to make the otologist take pride in the fact that it is he who is called upon to perform what is undoubtedly the most highly technical and difficult operation in all surgery.

DISCUSSION.

DR. DENCH: It is always a great pleasure to discuss any paper Dr. Richards may write, for he does his work so thoroughly, is so clear a speaker and so thoroughly a master that there is very little left for

discussion. He sent me a copy of his paper, and I assure you I enjoyed reading it and taking in points which I am very sure you cannot be able to take in thoroughly by listening. His work contrasts very favorably with the presentation by Chipault in his Operative Surgery of the Nervous System, in which he describes the technique for the removal of the petrous pyramid. That was printed in 1894, thirty years ago, and gives a very short but very good resume of the operation, but not so good as that of Dr. Richards.

Taking up a few points,—I was very glad to hear what he said about the undesirability of attempting to preserve the facial ridge in all cases. It is also a pleasure to note that Dr. Kahn, writing some years ago, disregarded it for exactly the same reasons as Dr. Richards has stated, i. e., that it prolongs the operation unduly in critical cases. We must understand that it is necessary in certain conditions to sacrifice the nerve—and the more popular the operation becomes the more lives will be saved. In dealing with desperate cases desperate measures are necessary, and the sooner we as surgeons give the public to understand that a living patient with a destroyed facial nerve is better than a dead patient with an intact nerve, by so much more will be able to benefit these very difficult cases.

In a case of suppurative otitis on which I operated some time ago, in which both pyramids were involved, I had the same experience as Dr. Richards, with a sequestrum on the nerve, and was able to remove this little collar of bone; I had never before seen a little sequestrum which slipped up and down the nerve. The patient had both petrous pyramids involved, and got out with a fairly good face.

In these cases where we know it is very likely that it will be necessary to exenterate the entire pyramid, why would it not be a good thing to tie off the internal carotid as a preliminary procedure? This will control hemorrhage and would be also indicated in cases of malignant growths.

I had a very interesting case with Dr. Abbe, in which the patient suffered from a sarcoma of the pyramid and had a very extensive radical operation. At the close of the operation I wounded the superior petrosal sinus, and said to Dr. Abbe: "We can only graft this cavity partially;" he replied: "I see no contraindication." We then removed the plug over the sinus and substitued one, concluding a Thiersch graft. The graft took perfectly, and the patient presented one of the most perfect graft results I have ever seen. Absolutely no harm came from it. Dr. Abbe said: "What is cleaner than a skin graft? It possesses a certain amount of hemostatic effect. That patient lived five years after the operation and died of apoplexy.

What Dr. Richards said about the modiolus is perfectly true,—of infection due to aspiration. I have also followed his suggestion of taking out the interior of the apix of the pyramid first and pulling out the shell.

My experience differs from his in wounds of the dura. In one case I took out the entire labyrinth and the dura was torn. There was no leakage in that case. The man made a perfect recovery. It would seem that wounds of the dura are sometimes not so serious as we are inclined to think. I believe I am the only man who has had the courage to report a number of cases where the dura was wounded. Accidental fracture of the modiolus is a very serious accident. I have never had it—more perhaps from good luck than good management. Where you have had a sinking of the medulla under the foramen magnum due to loss of cerebrospinal fluid, you can do a salin infusion either into the spinal cord or intravenously. In one case with tremendous headache and all the symptoms of brain pressure following lumbar puncture, I used hypodermoclysis with success.

I wish that Dr. Richards could drum one thing into the mind of everyone—that is, the use of the gouge or chisel in preference to the use of the curette. The gouge or chisel used along the axis of the pyramid is a very safe instrument; the curette is dangerous. In separting the dura from the pyramid, I find that the bulging back of a curette is a very useful instrument to protect the dura. If you use the chisel or gouge

along the axis of the pyramid, separating the dura from the bone with a curette, back turned toward the dura, you are very unlikely to tear the dura.

DR. DUEL: Dr. Richards was kind enough to send his paper to me also, in order that I might have time to study it and formulate a discussion of the subject. I really read it about two hours ago and immediately realized that I should have had two weeks, instead of two hours, in which to arrange an adequate discussion of such a valuable contribution.

Labyrinthine surgery has fascinated me ever since its inception. At the beginning I spent a summer in Germany working over this subject, where the anatomical material was more easily acquired. I returned with many specimens over which I worked for a long period, and supplemented this with a large amount of work on the cadaver. As a result of this effort I am convinced that I shall never have a sufficient amount of labyrinthine surgery to become an authority in the technique. Nevertheless the few cases one sees in a lifetime are liable to be so engrossing, indeed often so dramatic, that one almost unconsciously is impelled by them to discuss the matter with strong conviction. I waited for cases to appear in which the experience I had acquired on the cadaver might be utilized. In the course of nearly twenty years only thirteen cases have come under my own personal management. In addition I have seen a few cases in consultation.

Of my own personal cases six were acute; seven chronic. As the result of this very small experience, I feel convinced that every surgeon should have a well formulated plan with which to deal with his case when it appears. As I read Dr. Richards' paper this afternoon and heard it again tonight, I was struck with the fact that in every labyrinth case on which he was forced to operate it had been necessary to wholly exenterate the labyrinth or remove the entire petrous pyramid. In my own experience, there has been none in which the situation required the complete removal of the petrous pyramid. No matter how much experience one has had: no matter how many different methods one has tried, either on the cadaver on living subject, one is forced into the judgment in the end that it is a difficult matter to completely exenterate the labyrinth: often an impossible matter to completely exenterate it and preserve the facial nerve; and always extremely hazardous to the life of the patient as well when the complete removal of the petrous is attempted.

So my limited experience would lead me to classify these cases into *first*, the *acute type*, in which there is a rapid and complete invasion of the membranous labyrinth with destruction of the function, and impending meningitis. In these a complete exenteration is unnecessary in the best effort to preserve the patient's life. *Second*, the chronic type, in which in order to place the patient in less jeopardy of his life one has to operate, the extent of the operation depending on the condition found. *Third*, a type in which already the destruction is so great, as in several of Dr. Richards' cases, that there is no longer any question of preserving any facial function—nothing left but the off chance of saving the patient's life.

A large number of the cases with which we meet are the acute type, in which there has been a sudden destruction of the labyrinth as the result of the extension of the purulent infection from the middle ear, either acute or chronic, with a complete loss of function. In such a case I am convinced that it is much wiser not to operate the labyrinth during this very acute stage, for this reason: the barrier which nature sets up in all chronic cases, and attempts to set up in any acute case, is an effort to wall off infection from the meninges, and the trauma of the operation at this early stage may break down this barrier, thus precipitating the extension of infection which was to be feared. Once the barrier has been erected the labyrinth may be opened and drained with comparative safety, as is done in the chronic cases. In cases where the symptoms have suddenly arisen from a very acute middle ear, there is no probability of necrosis of the bony labyrinth: it is simply a suppuration of the membranous labyrinth, and such lesions in my opinion do not require com-

plete operation. What one is attempting to do in such instances is to drain the labyrinth of an infection which is threatening to provoke a meningitis. Should meningeal symptoms supervene in such a case, the obvious thing to do would be to attempt to arrest the infection. One would be operating not for a labyrinthitis but for a meningitis.

The very important anatomical consideration which Dr. Richards pointed out, viz: that the modiolus when broken off at the base readily allows a free flow of meningeal fluid through it, therefore becomes a useful adjunct. Our object in doing this operation is to secure drainage away from the source of infection. In such a case where meningeal symptoms develop I believe it of distinct advantage to uncap the cochlea, and completely remove the modiolus, thus securing a rapid flow of meningeal fluid. At the same time I would remove the internal plate from the sigmoid sinus well forward to the petrous and at that point again incise the dura. I should also do as Dr. Richards did in his case, make repeated spinal punctures to secure a free flow of the infected meningeal fluid.

I believe I made a mistake in two early acute cases with meningitis in prolonging the operation, in an endeavor to carry out the advocated plan of draining the labyrinth both in front of and behind the facial nerve, leaving a bridge of bone to support the nerve. In later cases I have simply uncapped the cochlea and opened the vestibule; this requires only a few minutes. In one case having an acute labyrinthitis and meningitis I did exactly what Dr. Richards did, by accident fractured the canal and produced a collar of bone around the facial nerve. Although by painstaking effort I succeeded in removing it without severing the nerve, the patient is living, with a permanent facial paralysis. I am almost sorry she did not die.

Whenever an acute labyrinth develops in a chronic suppurative ear, with complete destruction of labyrinthine function I am firmly convinced that it is sound practice to wait for a favorable opportunity to operate. If no meningeal symptoms arise—and there is a good chance that they may not—one can operate such a case at a later time with a much better expectation of life than if one had operated during the acute onset of the labyrinthine symptoms. Of course, if meningeal symptoms should arise one is forced to operate; but there again one is really operating for meningitis rather than for labyrinthitis, and I believe the best effort will be made by endeavoring to drain the meninges in the manner I have just outlined.

There confronts us a third class of cases in which one elects to operate for a chronic suppurative otitis. Functional examination reveals a long standing complete destruction of the labyrinth. In these cases I believe it unwise to attempt a radical operation without at the same time draining the labyrinth. How much drainage of the labyrinth should be done at such a time I think should depend entirely on the condition found at operation. Many are caused by cholesteatoma, and in many of them it is quite evident that there has been an erosion of the horizontal semicircular canal, and that the labyrinth as probably been invaded from that region. In such a case, it seems to me quite important to uncap the cochlea and also to open the vestibule, posterior to the facial nerve as well as anteriorly, leaving a bridge of bone to support the nerve. In such a case, I still think that it is wise, unless there is evidence of necrosis of bone, to content oneself with this procedure rather than make a more elaborate effort. Those of you who have attempted it will understand what I mean when I say that I have discovered no method of cutting down just a certain portion of the modiolus without occasional accident. I find that it is just as easy to fracture it by any method as to preserve it. I bow to Dr. Richards for his skill and shall ask him to show me, and shall try his particular method before saying it cannot be done; but I personally cannot do it, now, with any assurance of success.

So when a barrier has been formed between the meninges and the focus of infection, I prefer to leave nature to do a little of the work, and trust

to that rather than to attempt a manouver which may open up an avenue of infection.

I would like to reiterate Dr. Richards' injunction, to attempt nothing on a patient which you have not repeatedly done on the cadaver. With all the experience in labyrinthine surgery one can acquire, he realizes when doing it on the living subject, that it is most difficult. Whatever one attempts when operating living subject should be done with a definite idea of attack which has been practiced repeatedly on the cadaver. Failures under the circumstances will cause less chagrin.

May I call attention to another point? In my limited experience, of only thirteen cases, not one has ever brought a suggestion of the necessity for removal of the entire petrous. Although I have done this operation many times on the cadaver, if I had to do it on a living subject, I should approach it with much trepidation. I maintain that we should not look forward to labyrinthine cases as ones in which we should probably have to attempt such radical measures, but rather the contrary. I believe that the most conservative operation that one can do, and save a life, is the best in labyrinthine surgery. Dr. Dench has just said "a live patient with a facial paralysis is better than a dead patient with an intact nerve"; but I would rather say that a live patient with an intact facial nerve which is functioning, is much better or than one whose nerve has been ruined by too radical a procedure.

DR. JOHN B. RAE: Like the previous speakers I, too, have had the opportunity of seeing Dr. Richards paper. It seems to me that while there is much to study there is little really to discuss.

Dr. Richards makes brief mention of the fact that it is only a few years since otologists were discussing the advisability of routine exploration of the tip of the mastoid in acute cases. The paper tonight proposes in certain cases and under certain indications to continue exploration to the tip of the petrous. Between these two limits the advances in operative procedure have been made step by step. One must be struck by the realization that each step has been characterized by an increased familiarity with the minute antomy, a clearer understanding of the surgical pathology and an improved technique. These three requirements are fundamental and are all squarely met and fulfilled in the presentation made by Dr. Richards.

I am specially impressed with the importance of the technique in these cases. Attempt is made to eradicate disease to its limit so as to save life while at the same time every effort is made to preserve the facial nerve. In malignant cases this may be impossible and the nerve should then be sacrificed, provided that patient and relatives have entire knowledge of the possibilities and impossibilities of the surgical measures undertaken.

In suppurative cases the indications may not be so evident and the amount and character of the surgery attempted will be determined by the judgment and skill of the individual operator. In any case I am very deeply impressed with the need of purely technical training and can only repeat what the other speakers have said, that these operations should only be undertaken after long and constant practice on the cadaver.

Among the interesting observations made by Dr. Richards is that regarding the laminated structure of the pyramid with a similar arrangement of nutritional vessels aptly described by him as "nutritional planes". This may well repay study as it may explain the occurrence of post-operative sequestra.

In conclusion I congratulate Dr. Richards because in this paper he has made a real contribution to otology.

DR. RICHARDS, closing the discussion, said he appreciated the manner in which the paper had been received, and thanked the gentlemen of the Section for their discussion. In the malignant cases it is essential that a complete exenteration be done and that we make no attempt to save any of the petrosus structure. We cannot be conservative.

As to the cases of suppurative origin, he had seen only five cases in an experience of about twenty-two years. It is not surprising that we do not see more. These extensive cases of necrosis in which the disease extends

far beyond the confines of the labyrinth out into the body and the apex of the petrous will not be saved by a labyrinth operation; in fact, the labyrinth operation is but one step in the operation under discussion. We are confronted by extensive necrosis, and must be prepared to remove it, no matter where it leads.

As to whether or not a facial arch can be saved, that depends upon the extent and location of the necrosis. If we can save an arch for the facial nerve, we should do so; however, in a highly pneumatic bone, we run the risk of having the arch die subsequently from malnutrition, even though the bone is healthy at the time of operation; in this type of bone Dr. Richards thinks it wiser to make no attempt to save an arch, but to abandon the facial nerve to an environment of blood clots and scar tissues.

Dr. John R. Page: I also had the privilege of reading Dr. Richards' paper, and he has well said it is an operation of great magnitude.

It is, and rightfully should be, appalling to any but one whose temerity is born of the most careful study, experience and technical skill. One of less experience need never be too proud to back out of such a situation and postpone further necessary work until he can obtain assistance from one more experienced.

The difficulties are at a depth unfamiliar to most of us. I have never had occasion to follow infection beyond the labyrinth except in one case, which Dr. Richards will recall, in which I explored beyond, but in front of the labyrinth along the carotid canal. Fortunately such cases are not often met with, but any of us may stumble on one, and for that reason I shall strive to remember in detail the steps of the operation and the technical and anatomical difficulties in the different types of bone as Dr. Richards presents them.

The effect of respiration on the cerebrospinal fluid I recall having read of in MacEwen's book, but the practical importance of it had lapsed in my memory. I am glad to be reminded of it. The recovery of the case with streptococci in the cerebrospinal fluid is an occurrence that I also have read about, but have never seen.

Of all the difficulties so graphically described, the greatest to me is that of having to decide in a certain type of case to deliberately sacrifice a living facial nerve in order to properly complete the operation. In such a case I believe I should return the patient to bed with an unparalyzed face and an uncompleted operation rather than assume that responsibility. A great deal can be done in time to necrotic bone through an open wound with a mild solvent solution, such as Carrel-Dakin's hypochlorite solution.

In this respect the reference to the mastoid tip does not to my mind strengthen the contention. I do not, as I formerly did, invariably remove the whole tip. I do remove the cells from the tip but not infrequently leave a good portion of the outer plate of the tip to which there is muscular attachment.

The sharp edges are removed but there often still remains considerable of the cup-shaped outer plate and I have never seen necrosis of this occur. The Boston men, I believe, follow this method almost entirely.

This is a valuable contribution because it comes from a skillful surgeon and the most accurate minute and unbiased observer of my acquaintance.

Dr. Alfred Kahn: I have not had the opportunity like the other gentlemen of reading Dr. Richards' paper, but it has been a great pleasure to have had the opportunity of listening to it. Dr. Dench referred to the case which I reported in 1918, and to my paper wherein I recommended the severing of the facial nerve, stating that it was better to have a severed nerve and a live patient rather than a nonsevered nerve and a dead patient. The case that I reported had had a previous incomplete radical operation that had been done by another surgeon before he came under my observation. I operated further, completing the radical operation. The patient developed a meningitis and became unconscious; and there was a discharge of cerebrospinal fluid for quite a time. It was possible to explore through the promontory with a probe, as through the action of

disease a large fistulous tract had developed, destroying the bone down to the brain covering. We thought that this patient would surely die. He, however, recovered. With the knowledge gained from this case it occurred to me that an imitation of the action of nature in this patient would be a good surgical procedure, especially for draining infection in the region of the internal auditory meatus.

When I first began the study of otology there was an element of anxiety whenever the dura was exposed at an operation. I remember again, the fear of skin grafting over the dura; and now the bugbear of otology is opening the subdural space. In the *Medical Record* of Nov. 30, 1918, and THE LARYNGOSCOPE about the same date I described an operation wherein the facial nerve was destroyed and a large area of soft tissues was exposed. My reason for doing such a radical procedure (drainage) was therein described. At that time it occurred to me that surgery of the ear would advance along lines described tonight.

DR. PHILIP D. KERRISON: Dealing, as it does, not only with a somewhat rare pathologic condition and its surgical treatment, but also with the structure and the blood supply of the petrous bone, Dr. Richards' paper could be adequately discussed only after careful reading. Dr. Richards has said nothing of any clinical phenomena which may characterize the spread of an infection from the labyrinth throughout the petrous pyramid, and his description of the pathologic changes found before and during operation has of necessity been brief.

With regard to the practical deductions to be drawn, two questions would necessarily come up for discussion: 1 What, precisely, are the indications for such an extensive operation; and 2 the question of prospective average results without operation. In other words, the risks inherent in the lesion should be considered only in relation to the risks inherent in the operation itself. Among the latter, according to Dr. Richards, must be included in many cases the voluntary and permanent sacrifice of the facial nerve.

Dr. Richard's brilliant paper covers many phases of the subject of suppurative disease of the petrous bone, and constitutes a mine of facts from which we may draw much useful information.

DR. RICHARD (closing): I appreciate the manner in which this paper has been received and wish to thank the gentlemen of the Section for their discussion. In the malignant cases it is essential that a complete exenteration should be done and that we make no attempt to save any of the petrous structure—we cannot be conservative.

As to the cases of suppurative origin: I have seen only five cases in an experience of about twenty-two years. It is surprising that we do not see more. These extensive cases of necrosis in which the disease extends far beyond the confines of the labyrinth out into the body and the apex of the petrous will not be saved by a labyrinth operation; in fact, the labyrinth operation is but one step in the operation under discussion; we are confronted by extensive necrosis and must be prepared to remove it no matter where it leads.

As to whether or not a special arch can be saved; depends upon the extent and location of the necrosis. If we can save an arch for the facial nerve, I think we should do so; however, in a highly pneumatic bone we run the risk of having the arch die subsequently from malnutrition, even though the bone is healthy at the time of operation; in this type of bone I think it is wiser to make no attempt to save an arch but to abandon the facial nerve to an environment of blood clot and scar tissue.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

November 19, 1924.

The Management of Asthma. Dr. Maximilian A. Ramirez.

1. *Introduction.* I am not going to read a carefully prepared paper reviewing literature with which you are all thoroughly familiar, nor am I going to enter into a discussion of the various theories of anaphylaxis

and allergy. I shall attempt to present to you in a brief and concise manner the practical management of asthma.

2. *Types of asthma.* There are various types of asthma, and these may best be classified or grouped into those caused by specific proteins and those that are not caused by proteins. The group caused by proteins may be called True Specific Asthma, Allergic Asthma or Protein Asthma, and the causative protein may be either animal, food, pollen, possibly bacterial, or a combination. This type of asthma should be further subdivided, clinically, into those cases giving a positive skin reaction and those not giving a skin reaction to the proteins tested; it is well to remember that many cases of true specific protein asthma give a completely negative protein test, due to the fact that either the offending protein has been omitted from the list used in testing, or else the patient is in an antianaphylactic or antiallergic state and does not show a skin reaction to proteins to which he is really sensitive.

The other group, where symptoms are not caused by hypersusceptibility to specific proteins, forms the majority of all cases examined. I should say that between 65 and 75 per cent of the cases do not give skin reactions to proteins, nor do they give the history suggestive of allergic asthma. This type could be called nonspecific, nonallergic, or nonprotein asthma, and as it is almost always associated with a chronic bronchitis, could also be termed asthmatic bronchitis. This group is not caused by proteins, and must not be confused with the group previously mentioned where from one cause or another, negative skin tests were obtained in cases that are truly sensitive. It is particularly in this non-specific group that we find pathological conditions in the nose, throat and accessory sinuses as an important underlying or contributory factor. Diseased tonsils quite frequently are responsible for a persistent asthma. Disease in the nose and sinuses is such a common finding in asthma, that too much importance cannot be attached to this particular phase of the disease. There is no specific, nasal lesion. One case will have nasal polypi, another infected antra, another chronic ethmoiditis, and most cases have a combination of conditions. Every case of asthma should be carefully examined by a competent rhino-laryngologist. It is essential that every focus of infection in the nose and throat be *completely* eliminated, as it is practically impossible to obtain a satisfactory result in the vast majority of cases unless this is done, and unless removal of a focus is thorough, you are apt to have recurrence of symptoms in cases where a permanent cure could have been effected. Occasionally you will see a case sensitive to some specific protein, who will recover on elimination of this protein, in spite of a badly infected nose, but this is *not* the rule and most cases whether specific or nonspecific will have persistent symptoms and frequent relapses as long as there is definite infection in the nose, sinuses, or tonsils, even after removing the reacting protein.

However, I should like to caution against too much optimism, for a great many cases of asthma have extensive nose and throat operations without relief. And many cases have nose and throat operations for the relief of symptoms that are truly due to a specific protein, and will not improve until this substance, whether it is a pollen, animal emanation or food, is found and completely eliminated.

I think it well to make note at this time of the fact that many patients have an antrum full of pus without symptoms favorable to the sinuses, as they may also have chronic ethmoiditis or infected tonsils without local symptoms, and still these conditions be responsible for constitutional disturbances. I realize that this is a well recognized fact among rhinologists *but it is often* overlooked by the internist.

Just what causes the asthmatic symptoms in this group, where symptoms are due to pathological conditions in the nose and throat, is a question. Whether patients become sensitive to bacterial proteins retained in the nose, sinuses, or tonsils, whether paroxysms are due to action on the bronchial musculature by toxins, or to local action on the bronchial mucosa by pus and other secretion draining directly into the larynx and

bronchi or whether symptoms are a reflex due to a direct action on nerve endings in the nose, I do not know.

There is also a large group of cases that are comparatively free of bronchitis between attacks and may, or may not, have an associated nasopharyngeal condition, that I think are due to a *sympathetic-clonia*. This really constitutes a distinct clinical entity and should not be discussed as a type of asthma. However, as this is merely my own personal impression, I sha'nt give it unmerited emphasis, but shall discuss it in more detail, not, as a distinct entity, but as a type of asthma of extrinsic nonprotein origin.

In addition to the types already mentioned, there is still another group which I think is due to hypersusceptibility to a nonspecific protein radicle. These cases have definite, recurrent paroxysms of dyspnea, are free of associated bronchitis and are absolutely free of symptoms between attacks, but they do not give skin reactions to the various proteins used in testing. This class could be termed nonspecific protein asthma or nonspecific allergic asthma, and is the type that responds most satisfactorily to injections of nonspecific protein solutions.

The type of asthma classified as specific protein or allergic, which is due to hypersusceptibility to proteins and gives as a rule a positive skin test, may be caused, as previously mentioned, by food, animal or pollen protein or a combination. Of the foods, wheat, milk and eggs are very important, though any food may be the cause. Of the animal emanations, horse dandruff and goose feathers are probably the most common, though dog hair, cat hair and rabbit hair are not uncommon. Of the pollens, timothy and ragweed are the most frequent offenders.

However, every case tested should be very thoroughly tested, and every case of suspected asthma should be tested; as this is the only way of properly classifying the case.

Nonallergic asthma with a constant, associated bronchitis is usually bacterial in origin and the organism or group of organisms can usually be isolated from the sputum.

The so-called bronchial sympathetic-clonia cases are probably the result of intestinal absorption and a coincident endocrine dysfunction. Practically every one of these cases have intestinal stasis; either high or low blood pressure, usually low; either high or subnormal metabolism, more frequently low. In passing, I shall say that a large series of blood chemistry observations showed nothing of definite value. The plasma chlorids seemed rather constantly higher than normal, and in the nonspecific type, the blood sugar was moderately increased.

3. Treatment. The treatment of asthma naturally resolves itself into the treatment of the various types as well as treatment during and between attacks.

The treatment of the specific protein or truly allergic cases consists in completely eliminating the offending protein, and in then attempting to actually immunize the patient by injections of increasing doses of the specific protein to which they are sensitive. The result of treatment in this type is fairly successful. Patients sensitive to a specific protein or group of proteins usually improve very rapidly if the offending proteins are eliminated. However, the permanency of active immunization is another question and one about which I have grave doubt. I feel that active immunization against animal emanations, as, against the pollens, lasts a variable time and must be repeated. Immunization against foods is more lasting. I do not know that this is a generally accepted conclusion, but it is my impression from a rather large number of cases carefully observed.

The treatment of the nonspecific or nonallergic cases is that of chronic bronchitis. Medicated inhalations, sodium iodid intravenously, vaccine either autogenous or stock, various expectorant mixtures, etc. The result of treatment in this type of case is not so satisfactory as it occurs more frequently in older patients, the terminal bronchi are usually dilated, and there is a good deal of emphysema and increase in peribronchial fibrous tissue.

The nonspecific protein cases are treated by injections of nonspecific protein solutions such as peptone, milk or large doses of mixed vaccines. These cases also are quite resistent to treatment.

The sympathetic-clonia cases are great benefited by duodenal lavages, colonic irrigations, intravenous injections of calcium chlorid, and proper gland therapy. The result of treatment in this group is quite satisfactory. Patients improve readily though they have to continue treatment for some time.

Treatment of diseased condition in the nose and throat is, of course, necessary in all types of asthma, and for purposes of emphasis. I should like to repeat that it is most important, to thoroughly and completely eliminate foci of infection and absorption, not only from the nose and throat, but any focus of infection in every case of asthma. A true specific case, giving a positive skin test to various proteins, may continue having frequent paroxysms until an infected sinus or an infected gall bladder is properly drained, or a pus tube removed; on the other hand, it is also well to remember that the finding of definite foci of infection, such as infected tonsils, polypi, infected gall bladder, etc., does not necessarily mean that they are in any way responsible for the asthmatic symptoms, and though they should most certainly be treated and completely eliminated, the patients must not be told that their asthma will be cured, for we all see any number of asthmatics that have been operated for one thing or another with definite promise of cure in whom no relief from paroxysms was obtained.

I should also like to say a word about the use of the bronchoscope in asthma. I think that in the nonspecific cases, particularly if they are not of terribly long standing, you get quite a bit of relief following local application to the lower part of the treachea and primary bronchi of a solution of adrenalin and silver nitrate. In long standing cases with a great deal of peribronchial thickening, emphysema and stricture of the terminal bronchi, the results are not satisfactory and the relief from symptoms is of short duration.

Now, just one word about the choice of vaccine. There is a good deal of question as to the comparative value of stock and autogenous preparations. Personally, I prefer a freshly prepared mixed stock vaccine, but I do not feel that we can for many very definite conclusion for we con stantly see cases that do not improve while on an autogenous, and seem to improve on changing to a stock vaccine, and on the other hand, we also see cases that do much better on an autogenous than on a stock.

DISCUSSION.

Dr. T. J. Harris said that the members of the Section owed a debt of gratitude to Dr. Ramirez for his very clear exposition of a subject, which, for those working in a special field came with a good deal of force, since it embodied the views of others who were working on the same subject as internists. It was interesting to know how a subject like asthma was still before those who are studying to determine its cause and treatment. Looking over the literature a few days ago, he had found that the references to the subject for the last two months were just as numerous as they were when he had been looking into the subject some fifteen or twenty years ago. That means that the cause of asthma has not yet been found, nor a sovereign treatment discovered. The classification given by Dr. Ramirez with what he had presented of his views, particularly in regard to the protein form of asthma—what had been said in regard to the intestinal condition and in regard to the nose and throat, would, to a large degree, be agreed to by most. It was a conservative and very judicious presentation of the subject.

It remained for the nose and throat men to speak of their own experience. Special reference had been made to the relationship of the nose to what is spoken of as asthma. The oldest surviving member of the Section was the first to come forward with the view that the nose was the cause of asthma. In 1884-85, Dr. Bosworth made the statement in his well known book on the nose and throat, that he believed that the nose was involved in every case of asthma. He investigated over eighty cases and

thought he had shown by the returns that his position was sound. Based on that investigation, he made the recommendation that every case should receive careful nasal treatment, and he believed they would be cured. It is a long time since then, and we have gone a long way from that position. Recently Dr. Schamberg made a statement with which probably all would agree, that we rhinologists have allowed the impression to go forth that nasal treatment is a sure cure for asthma, and that numerous operations have been done on the nose which were unjustified and produced no results.

Dr. Harris said that the essayist was very sound, and he agreed with the conclusions that in many cases the nose can be involved without asthma being the result, and that in many cases work on the nose was done without producing the desired result. He had been interested in the statistics that in 65 or 75 per cent of cases representing the non-specific group the larger number have involvement of the nose. In a recently published paper, a Chicago man claimed to have presented a new and successful treatment for asthma, and this method revolves around the view that in every case of asthma there is a hypersensitive ethmoidal region in connection with a disturbed nervous system; and brings out the view—with which Dr. Harris agrees—that for the most part asthma is a toxic condition; but when he goes so far as to make the statement that every case of asthma can be cured by proper treatment, he goes further than most men would attempt.

Dr. Harris said that his own views were very much in line with those of the essayist. He knows of cases that have been very much helped by operative work on the nose, but on the other hand, any such statement as that all cases of bronchial asthma show involvement of the nose, is not true. In case after case he has never been able to find any gross pathology in the nose. Like other conditions in rhinology, it means that if one well known specialist makes a statement, and another equally competent man makes another statement, it would only prove that the work and technique of one was not so thorough and searching as that of the other, and that the latter found the source of the trouble and relieved it. If it was only one who agreed to that conclusion, it would be different, but Dr. Harris said he was confident that his own experience was that of the majority. Dr. Harris said he was convinced that many of those in the audience whom he had known for years had tried and been disappointed in many cases where the most careful and painstaking surgery on the nose had been done without relieving the asthmatic conditions. Of course in cases filled with polyps, etc., the removal gave relief; but in many of the cases that condition is not present, the antrum is not filled with pus and there is not a sinusitis. Any sweeping statement that the nose is the source of the trouble and that to relieve a hypersensitive area would cure the asthma, is going too far. It would be very gratifying to have someone truthfully say that his experience showed 100 per cent of cures in the cases referred, but it would be most surprising.

Unfortunately, the essayist's conclusions were not very encouraging, when he stated that the protein treatment is not lasting—and that there is only a toxemia which is commonly relieved. When he spoke of the relief obtained by taking care of the intestinal canal, it was in line with Dr. Harris' own view, that if the toxemia is relieved the more certain we are of relieving the condition in the bronchi.

Finally, referring to the work that Dr. Freudenthal has been so much interested in, Dr. Harris said that here, again, his experience had not been that of Dr. Freudenthal. He had followed that work carefully, but his own experience had not been very encouraging.

Withal, however, he agreed with what the essayist had said: that where there is manifest pathology in the nose, it must be relieved, and because it is so common, a cursory examination is all too little to give, and that when a case is referred to a rhinologist he should not and must

not stop short of exhausting every means for relief and that might discover the condition in the chest.

Dr. E. Ross Faulkner said that Dr. Ramirez had made a very fine and concise statement about the present status of our knowledge of asthma. That topic always made him think of the old dictum of the professor who spoke of skin diseases—that there was one kind that arsenic would cure, another than mercury would cure, and another kind that the devil himself could not cure. That pretty much described asthma. Dr. Faulkner said that he himself had not had much experience with the specific protein type of asthma; perhaps that used to be operated on unnecessarily more frequently than is done today. In recalling numerous cases that he had operated on it would be difficult to say what the results were, after all; for when it comes to the operative treatment of the nasal sinuses one has the most difficult field in the human body; you may think you have eradicated the whole focus of infection, and yet the condition will not be relieved; unless you eradicate the entire nasal focus, you will get no lasting result. The best results he had ever obtained on asthmatics had been in cases where he had been most radical. Last June he treated a young boy who had been troubled with asthma for two years and could do nothing. His nose was a mass of polyps in the ethmoid region, and both antra were filled up. After an intranasal operation, he was greatly improved; they usually are. Then he came back and a radical sinus operation was performed, and he improved for a time, then relapsed again; he then had some bad teeth taken out; one antrum was cleaned up at that time. The other antrum has had intranasal drainage. but if there is any return of symptoms a radical operation will have to be done. The boy has been practically well ever since; he has been comfortable and has gone back to work.

Some cases operated on were much improved but still have slight attacks of asthma; but the more radical the operation, the more completely the focus of infection was removed, the better the result; and many were practically cured. One of the first cases that he had operated on remained well for four years and then relapsed. During that period the patient had no symptoms of asthma. Finally a protein sensitization test was made and she was found to be sensitive to various proteins, and was given inoculation; she was also given colon irrigation, but that did not improve her very much. On looking into the nose some granulations and adhesions were noted and after removing the adhesions her asthma again disappeared. It seemed probable that they were the type that Dr. Ramirez spoke of as due to protein radical. It is a poor thing to reason by analogy, but in the causation of migraine and many other diseases there are two factors: there is a sensitization produced by absorptions from the intestinal tract, and an exciting focus somewhere else. This exciting focus is often in the nose, in cases of asthma, and removing that will relieve the symptoms.

In the case of the sister of a physician, a simple submucous resection was done and her asthma was relieved. That was a case in which there was mechanical pressure in the nose as an exciting cause.

So many remedies have been advocated that it is a good thing that rhinologists are getting their knowledge on a more definite basis. These cases can now be tested for protein sensitization with fairly definite tests. Some recent work has been done in St. Luke's Hospital for bacterial sensitizations, and it seems as if more definite results will be attained by working along this line. The organisms have been isolated, and a skin test made to learn which organism is producing the sensitization. A vaccine is then made and very excellent results have been reported.

Referring to various curative agents, the new quartz lamp has been claimed as a cure for asthma, but in Dr. Faulkner's case did not believe it had been very successful. The rationale has been explained as that it causes the fixation of the calcium treatment, assuming that most of these cases have a low calcium content—but he had not been able to follow that reasoning.

He wished to tell of one very curious case of asthma that has been referred to him by a physician who had referred a number of these cases to the Clinic; this doctor said that the patient required operation; that the man had asthma every year and nearly died of it, that he had a bad nose and should be operated on. Examination failed to show any bad condition in the nose. He was employed in the fur business, and on inquiring if he had the asthma every year at the same time, the man said yes, and that his wife had the foolish notion that it had something to do with furs—one particular kind, he was always sorting cat furs at that time. He was then told that his wife was probably right. Had it been years ago, in the days that Dr. Harris had referred to, when rhinologists thought that all asthma was due to some condition of the nose, an operation would probably have been done.

He then told of another case that had been treated by a house surgeon who was a very devoted follower of Dr. Sluder. The patient had come to the Clinic with a very severe attack of asthma. He had cocainized the sphenopalatine ganglia on both sides, and she was immediately relieved. She said she had never had anything relieve her so quickly before, except a very large dose of adrenalin. It was probably due to the absorption of cocain. Incidentally a very good ethmoidal operation had been done.

Dr. Faulkner closed by reiterating that it was very gratifying to feel that a more definite status is being established in our our knowledge of this very troublesome disease.

Dr. Marvin Jones said he had been asked to speak on the chlorin aspect, but that he wished first to say a few words about something in Dr. Ramirez' paper which appealed to him as being important. In hayfever conditions large, pale turbinate had been found which secreted large amounts of mucus. In the asthmatic cases the opposite condition was the rule, the membranes being dry, red and lustreless, usually an atrophic condition was present. He said he had considered for some time the possible effect on the sympathetic nervous system which would produce the results found in the allergy cases.

We have various chemicals and micro-organisms which will produce a hypersensitive sympathetic system; is it not then feasible to suppose that the reaction to certain irritants is merely an indication of reduced resistance and that we are dealing with symptoms rather than the true cause?

Referring to the chlorin treatment, Dr. Jones said that he had had experience with 300 cases. Included in this number were five cases of asthmatics. The cases of asthma were made very much worse and there was some difficulty in bringing them back to normal. There were a few tuberculous cases and they complained of discomfort following the treatment. The acute rhinitis and acute laryngitis cases seemed to receive some benefit, but it was questionable whether it was any more beneficial than has been obtained by medication now used in office work. In the chronic cases there was no lasting benefit. The point where the bacteria were killed was too concentrated to be easily tolerated by the patient except under very favorable atmospheric conditions. While .02 mg. per liter is easily tolerated on favorable days, it is not tolerated as a general rule.

Dr. Harris A. Houghton: The opportunity to hear a careful digest of the large experience of Dr. Ramirez in the study and treatment of bronchial asthma has been a pleasure. It has contributed much to my knowledge of the subject as much satisfaction in knowing that the fate of these unfortunate sufferers may be softened with greater certainty than at any previous time. The problem also affects the metabolist. Dr. Ramirez touched upon this in saying that in a large series of blood chemistry examinations, nothing which can be claimed to be exclusively characteristic of asthma, was shown. He noted that the plasma chlorids seem constantly higher than normal, and in the nonspecific types, the blood sugar is often moderately increased.

The number of asthmatics who have been examined by methods usual in the practice of blood chemistry in my series, is not large enough to warrant any fixed generalization. What I have to say must be taken in a suggestive way, but it appears that the evidence is sufficiently convincing to say that there is a malmetabolism which fits into the clinical picture of bronchial asthma, and that if taken account of, the percentage of relieved cases will materially increase.

It is almost a truism that any patient suffering from bronchial asthma for a long time will develop focal infections of the nose and throat, assuming that the primary cause, the initial hypersensitiveness, is not due to a prior infection. In the latter instance, we must conceive of a medical history which starts with the infection itself. Such patients belong in the category of so-called bacterial protein sensitization. In both classes, a certain modicum of success has been achieved from nose and throat surgery. The same surgical procedures, yielding good results in some cases, lamentably fail in others. I congratulate Dr. Ramirez on his emphasis of the point that foci of infection must be completely removed. In watching competent rhinologists work, I am satisfied that a determined attempt should be made but in some cases at least it cannot be done. This fact may account for failure in the use of bacterial vaccines, the original focus having been either overlooked or been incompletely removed. Surely, we would not expect a vaccine to relieve when the original focus is still present. Those who practice nose and throat surgery are often up against anatomical deviations from the normal, both in diagnosis and treatment, which preclude success.

Assuming, then, that bacterial infections are the primary cause, or better, perhaps, the determining cause of bronchial asthma in some cases, the sensitization being that of bacterial proteins, and that bacterial invasion of the hypersensitive mucous membrane is always secondarily present in the nonbacterial protein sensitization types, we must be prepared to recognize the evidence of these infections in the field of metabolism. For that purpose, it would be better to give a description of what has been found in one case of bronchial asthma, as typifying many others which have come under observation.

The patient was Mrs. E., about 56 or 57 years of age. Early life was characterized by the usual history of scarlet fever, with subsequent recurrent attacks of sore throat until of age. In latter years, she has had two or three attacks of grip. She has had bronchial asthma for many years, of the nonseasonal type, and usually determined by an attack of "cold in the nose". The weather has more to do with the onset than any other known factor. For the past two years, her asthma has been almost constant. There have been few nights when she has slept without interruption or could sleep with low head. She came under my observation in June, 1924, and on the primary examination showed all the characteristic signs of asthma. The heart muscle was somewhat degenerated. The blood pressure was 180/85 m.m. The fact that two years before she had been pretty thoroughly gone over in the matter of skin tests with results uniformly negative, and that the tonsils were obviously infected, led me to believe that it was a case of nonspecific, bacterial protein sensitization. I urged, of course, thorough surgery on the nose and throat, but the suggestion was waved aside, and I was driven to see what could be done working by the usual methods of the metabolist.

The chemical examination of the blood yielded the following result, the examination being made on June 5. The technique employed follows: two glasses of water were taken, one and one-half hours before examination. The urinary bladder was emptied an hour prior to withdrawal of the blood, and thus to work out the Van Slyke coefficients, we had the withdrawn blood and the one hour's collection of urine.

Weight: 55 kilos. Red cell volume: 41 per cent (normal, 37-45 per cent). Passed in 60 minutes, 275 c.c. urine, equivalent to 6,600 c.c. in 24 hours (normal rate, 1,000 c.c. to 2,500 c.c. per 24 hours).

(All substances in the blood are expressed as milligrams per 100 c.c. plasma; in urine as per cent. Figures used in calculating the coefficients are expressed in grams per liter.)

For purposes of comparison, the figures which developed from an examination on June 25, following twenty days of careful dieting, are given in parenthesis. Abnormal figures are given in black type.

	Blood Plasma		Urine	Van Slyke's Coefficients		
	Patient's	Normal	Concentration	Daily Output	Patient's	Normal
Urea	**29.5** (17.5)	12.-24.	.261 (.27)	17.2 (6.5)	**3.5** (3.2)	4.5-10.5
Uric Acid	**4.8** (2.6)	.5-2.0	.0102(.015)	1.67(0.36)	**0.85**(1.2)	1.5-4.0
Creatinin	1.0 (0.9)	.3-1.2	.016 (.039)	1.07(0.94)	**6.5** (9.0)	8.0-25
Sugar	**310.0** (130.)	80.-120.	.73 (0.44)	17.52(1.07)	0.95(0.7)	0.5-1.5
Chlorids	**615.** (594.)	520.-595.	.17 (.081)	**11.2** (1.94)		
Chlorids calculated:	587 (571)					

Ambard's	Threshold
Patient's	Normal
590 (585)	562

Carbon dioxid absorption capacity of the blood plasma, 61 per cent. Normal, 53 per cent and above.

Daily output of ammonia in urine, 1.07 gr. (.38 gr.). Urine: Specific gravity, 1.011 (1.003). Albumen, very faint trace (very faint trace). Casts not found in either specimen.

Now, as to the interpretation of this blood chemical picture. The first examination indicated a marked functional incapacity of the kidney for the end-products of nitrogenous metabolism. The retention, with the single exception of creatinin, was marked—not excessive. The examination also confirmed the statement of Dr. Ramirez in that there was a heavy retention of chlorids and the blood sugar was high. As to the former, it also confirms the usually accepted fact that in all but 20 per cent of high blood pressure cases, the chlorids of the plasma are increased.

The figures also disclose the fact that the patient is a true diabetic, in this instance to be expected, for the condition is a characteristic of the family. After twenty days dieting, another blood examination was done, and the results are in the parentheses. The improvement speaks for itself. The dietary was low in sodium chlorid, as shown by the daily output of the second examination compared with the first (1.94 to 11.2). Sugar was excluded and carbohydrates were used in such form as to be low in concentration. The nitrogen intake was also much reduced as shown by comparison of the two examinations in urea output per day.

Much more could be gotten out of these two examinations, but the above will suffice for our purposes. Leaving out of the question the high sugar content of the plasma, we have here a picture which is not characteristic of asthma *per se*, though found in most cases of long standing. From long experience, we do regard this picture as one characteristic of chronic, long standing focal sepsis, possibly initiated by some acute infection, such as scarlet fever. The figures indicate marked kidney incapacity for the excretion of the substances mentioned. The medical history of this patient probably followed that of others in that, the first effect of this type of irritation, usually of bacterial origin, curtails the functional capacity for excretion of salt; then follows a "close-down" of uric acid, urea and creatinin, in the order named. In this instance, the creatinin output remains unaffected.

In the meantime, with all this knowledge in front of us, and with all the effort which had been made to reduce symptoms, what had happened to the patient? She was sent to bed, and this diet, low in sodium chlorid, sugar-free, low in nitrogen, and the starch concentration of which was low, was started. The glucose-fat ratio after the formulae of Woodyatt was 1:1.5, thus utilizing all the calories that could be safely obtained

from fats. The total caloric value was 1400 daily. The total value of the caloric intake was 1400.

Within three days the patient passed an uninterrupted night's sleep, the first in months. Within a week, she was sleeping flat on an ordinary pillow, an experience which she had not enjoyed for two years. A disagreeable ventricular extra-systole disappeared and at the close of this period of observation, her blood pressure was 110/75 m.m.

The patient had been relieved symptomatically only. She has not been cured. Too much emphasis cannot be placed on this statement. The experience happens to be the best one of several. In every case so far, where a faithful attempt has been made along these lines, *some* good has been done. There have been some failures owing to the fact that the co-operation of the patients have been difficult to obtain.

I have listened with great interest to this paper by Dr. Ramirez and to my fellow practitioners who have participated in the discussion. It seems to me that there is a constant allusion to an unknown factor in the genesis of bronchial asthma, the factor "X". Can it be that this unknown factor to which constant references have been made here tonight, lies in the perverted body chemistry, occasioned by bacterial infections which are so characteristic of the condition? Can it be possible that this kind of perverted body chemistry will maintain an asthma once initiated by other etiological factors even after these factors are removed and that patients will not improve symptomatically until this perverted chemistry is corrected?

Dr. B. E. Leatherman (Toledo) said that Dr. Hazelton, of Chicago, was a personal friend and had been so for a year or more. He had been devoting a great deal of time to the study of bronchial asthma with some satisfactory results, others very unsatisfactory. Last February he had spent two weeks with Dr. Hazelton, in his office. A few months before that Dr. Hazelton and one of his associates had come to Toledo and given his conception of bronchial asthma, and the idea was so revolutionary that it attracted great attention. Dr. Leatherman said he was familiar with Dr. Hazelton's theory, and those who had read his articles would remember that he did not believe that every nasal trouble or nose caused bronchial asthma; he said that every case of bronchial asthma has some kind of nasal trouble; they have a lot of other things very often, but that most have some kind of nasal trouble, and he chooses to call it an empyema. He claims that asthma is a toxic condition, a toxemia, a chronic sepsis, and that most cases have in addition an ethmoiditis, else they will not have bronchial asthma; they may be sick otherwise. He says that it is brought about by the trifacial nerve to the brain and possibly the trigeminal, etc., etc. He brings out very emphatically that the nose may be only one factor, and may be a very important factor. The ethmoidal area, including the middle turbinate, furnishes the sensitive zone, the trigger that brings about the explosion, and the ethmoid may also furnish the source of the infection. The patient may have an ethmoiditis that brings about the chronic sepsis; but, on the other hand, the chronic sepsis may be caused by a gall bladder condition, bad teeth, a chronic appendicitis, etc. He lays great stress on the fact that it may be in the intestine. He says that the treatment of asthma is a two-man job; no one man can successfully treat a large number of asthmatics; it needs a competent internist and a competent rhinologist.

Dr. Leatherman said that he studied with Dr. Hazelton for two weeks, and saw a number of asthmatics from different parts of the country, and as far as could be seen he was getting the results claimed. He himself had not gotten such good results, but Dr. Hazelton said that it was because he had not been able to secure the aid of a good internist, that the patient must be relieved of everything that was wrong, every sort of infection, and in addition must have proper ethmoidal treatment. He had a kind of treatment that most regular physicians never heard of. Dr. Hazelton is a homeopath, and most regular physicians read very few

homeopathic journals. He says that successful treatment does not mean operation alone, but also the application of the treatment, prolonged in most cases. This treatment was devised by Dr. Dowling, of Albany, and is a very remarkable one. Since Dr. Hazelton has been writing about this treatment, many have tried it, and many have condemned it. Dr. Leatherman said that he had not himself used it as it is really recommended and condemned. Of course if anyone saturates a piece of cotton with argyrol and pushes it up the nose he is not likely to get good results, but that is not the Dowling treatment. Likewise, in the application of the Dowling treatment to the nose, you have to have someone show you how to do it. The internist must make a very careful study of the patient and find out everything he can that is wrong.

One of the most striking cases Dr. Leatherman had seen was the treatment of a medical man who had been forced to give up his practice for a number of years. The first thing in his treatment was the removal of his gall bladder. They hospitalize every case, and claim to have gotten 100 per cent results, but they select their cases very carefully. They claim that the main thing that regulates the selection of their cases is whether the patient is able or in posiion to take the treatment; and they will not take a case unless the patient will go into the hospital and stay there long enough to take the treatment thoroughly; they will not take anyone under any circumstances who will not convince them beforehand that he can take the treatment, and they have him pay beforehand as a guarantee that he will do so. They say that asthma is a rich man's disease. They turned down no one because it was a bad case, but they all had to have the money, for often the patient was in the hospital for two or three months.

Dr. Leatherman said he was convinced that Dr. Hazelton had something which he himself had not been able to work out as yet, but that he was going back to Chicago and get further information and see what he could learn, and if the results have been continued.

Dr. A. C. Howe said that he had been interested in the study and treatment of asthma as a rhinologist since Goodale, of Boston, published his work some fifteen years ago, and had been unable to convince himself that there is very much asthma that is not protein or allergic in nature. He had been much interested in the paper just read, for it showed a study of asthma that is rarely given to this subject. The classification was somewhat confusing, for Dr. Howe believed all asthma is allergic and would classify all cases as follows: bacterial asthma; inhalatory asthma; and food asthma. All of these cases will practically react to dermal tests in one of these lines and will respond to treatment along that line.

Many cases are classified as asthma that are not asthma, but are really bronchitis or dysnopia, perhaps of cardiovascular origin. It is absurd to think of treating every case of asthma as of bacterial origin.

In going over all cases treated in the past four years 50 per cent were of inhalatory origin; 35 per cent of bacterial origin; and the rest of food origin—so that it is unreasonable to treat every case of asthma from a rhinological standpoint. It is not logical to treat a case of asthma surgically, regardless of the condition of the nose, when it is due to the inhalation of some protein; and especially when 50 per cent of the cases that come under observation are of inhalatory origin. The bacteriological cases, which are particularly the rhinological cases, were found to be about 35 per cent; these are the cases that respond to intranasal treatment and to injections of bacterial proteins. Practically all of these cases, or a large percentage of them, responded to protein tests, and where very pronounced dermal reactions were secured, it was found that the cases responded at once both to intranasal operation and also to the injection of bacterial vaccine or toxins.

Dr. Howe said he did not believe in the condition of sympathetic-clonia in any type of asthma, and that he wished to reinforce what the reader of the paper and other speakers had said in regard to the need for radical intranasal work. He had never seen a case of asthma improved by ton-

silectomy or by the removal of teeth. They had found that a large majority of the cases were due to infection of the sphenoids and posterior ethmoidal cells, rather than to the anterior cells; that the rest were due to involvement of the antra.

The treatment by operation for asthma must be very radical; there must be complete exenteration and the widest possible drainage and ventilation of the larger antra. Some ten years ago he had treated a case of asthma that had impaction of the middle turbinate against the septum. The patient was a woman who had suffered from asthma for forty years. The asthma vanished over night after the anterior tip of the turbinal was removed. He had seen case after case relapse when the sphenoid closed; but the symptoms vanished as soon as drainage was re-established and remained away so long as the sphenoid remained open. A large amount of pus in a parasinus is not necessary to cause asthma nor does it require a large amount of absorption of infected material, as the absorption from a limited area in one of the larger sinuses is sufficient to precipitate an attack of asthma.

Dr. Howe said they combined the injection of vaccines and toxins with all the intranasal work, and the results had been most satisfactory. As to the permanency of the result of the immunization, they had patients who had retained their immunity for eight or nine years, apparently permanently immunized. As to the injection of animal proteins, patients subjected to that treatment had remained immune for four or five years; so that there was reason to hope that this protective immunity would remain permanent. But when the ashma was of bacterial origin, the immunity would last only till the next severe reinfection, when a few injections would usually relieve the attack; long periods of freedom from symptoms have frequently been secured by bacterial injections alone.

Dr. Wolff Freudenthal said that Dr. Ramirez had given an excellent idea of his views on asthma from his large experience. He had stated that 25 per cent of the cases are of a specific nature, and the rest he liked to call nonspecific. Dr. Freudenthal said that he had handled the nonspecific cases. Among those 75 per cent of the cases he sees, there is always a focus somewhere in the system, *plus* something else. Dr. Faulkner had spoken of applying cocain to the sphenopalatine in one case and stopping the attack immediately. That was nothing unusual. Three years ago he had treated a case at the Montefiore Hospital in which the girl was cyanotic from bronchial asthma. She was known to be able to produce such attacks whenever she desired to do so. He had called up the house doctor and in a loud voice asked him for "the strongest injection of morphin". A few saline drops were injected, and the asthma stopped immediately. These are exceptional cases because they are all of purely hysterical origin.

But one comes to the question: What is this attack, this spasm? Dr. Freudenthal said he did not call it a spasm of the bronchi, for he did not believe that a spasm could exist for two or three days, or a week, with only slight intermissions. He had made some experiments, and believes that one has here to do with a spasm of the dilator muscles and a secondary constriction. This is of importance because the sympathetic nerve is involved, and for that reason we see so often the beneficial effect of adrenalin in acute attacks.

What must the rhinologist do when such a case comes to him? Of course he must operate radically, if he does operate at all, but he should not always operate right away. Dr. Freudenthal said he has seen cases that developed asthma *after* nasal polypi had been removed. That was what he called traumatic asthma. He had once treated a patient for several weeks for polypi in the nose. The intestinal stasis was first relieved, and later the polypi were removed and the ethmoids were operated upon. If it is not intestinal stasis it is something else that causes the attacks. He had cured many patients by treating their rheumatic conditions exclusively.

Dr. Freudenthal said he could not subscribe to what had been said about Dr. Hazelton, for it was not the ethmoids alone that caused the trouble. It is sometimes the antrum or any other condition that produces the asthma. He had himself cured cases by removing the adenoids, but he had never seen a case cured by removing the tonsils or all the teeth! He subscribed to everything that Dr. Harris had said so well, with one exception: He has used this intrabronchial treatment frequently—not in every case, but in selected cases only. The treatment is sometimes difficult, as some of these patients will become cyanotic right away. In many selected cases it has done good, where other treatment had failed entirely.

Dr. Mark J. Gottlieb said that the paper was one that contained a good deal boiled down into a few words, and what was said was undoubtedly the result of an experience based upon painstaking care and honest effort. He said that he agreed with everything that Dr. Ramirez stated, with the exception that he agrees wth Doctors Freudenthal and Howe in never having seen a patient recover from bronchial asthma as a result of the removal of the tonsils. Swain in a symposium on asthma at the Twenty-first Congress of the American Laryngological Society said that it was his opinion that for the production of asthma in an individual, there must be some constitutional quality in that person which would render him susceptible to an exciting cause. That is an unusual thing to find in the literature of that day, for it was not conceived until eleven or twelve years ago, that heredity is a fundamental characteristic in the individual which predisposes him to asthma.

It was gratifying to hear Dr. Faulkner speak about cocainization of Meckel's ganglion. Dr. Gottlieb said that he had tried this method, but had not been able, even with very strong solutions to obtain the prolonged effects that Dr. Sluder apparently gets.

What Dr. Faulkner said about the work done at St. Luke's Hospital was most interesting. He had heard Doctors Touart and Thomas with a lantern slide demonstration before a meeting of the New York County Medical Society. Goodale was the pioneer in that field, that is in testing for sensitization, by using autogenous suspensions of bacteria on the skin. Subsequent to that, Dr. Gootlieb himself had done some work on the intestinal flora, using intradermal suspensions of autogenous bacteria, and then came the work of Touart and Thomas. This has been very elaborate and portends that valuable information on this subject will eventually be obtained.

In the case if sinus disease as related to asthma, the rhinologist must necessarily take a deep interest. Dennis, in a recent article, on the relation of nasal accessory sinus disease to asthma, emphatically states that to obtain results, one must operate on all sinuses that are under suspicion. A small percentage of cases of asthma with diseased sinuses demonstrate pus. The majority were hyperplastic. The results which he reported were good. Lintz, however, emphatically states that nasal accessory sinus surgery in cases of asthma is useless and other methods should be tried.

Dr. Gottlieb said that he had gotten some good results from surgery on the paranasal sinuses, but on the other hand in some cases, the results were not satisfactory.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

January 12, 1925.

Double Empyema of the Maxillary Sinuses. Dr. M. M. Cullom.

Dr. Cullom reported the case of a white male, age 18 months, who in 1916 was brought to him because of a unilateral purulent nasal discharge which had been present for some months. On account of the age of the patient a foreign body was suspected, but a careful search failed to reveal such. A bland oily spray was prescribed.

About eight years later the patient was again brought in by his parents, who stated that he had a bilateral profuse nasal discharge. The child's appearance was that of an under-developed boy, his color was bad, and his appetite poor. Examination revealed both nostrils filled with offensive pus and adherent crusts. The appearance was that of atrophic rhinitis. Transillumination showed both antra very dark. Drainage of the antra was advised. A large opening was made under each inferior turbinate, the atrophic condition of the turbinates rendering an anterior turbinotomy unnecessary. The operation was followed by irrigations. The crusts disappeared from the nose, the boy's color promptly returned, and he developed an enormous appetite. The washings at this time contain very little pus.

The point of great interest in this case is the appearance of well marked empyema of the maxillary sinuses at the age of 18 months and the development of a chronic empyema of both antra at that early age. It would be interesting to know how early the pus made its appearance in the antrum.

DISCUSSION.

Dr. Jere W. Caldwell: It has been my experience that where a sinus condition is associated with a great deal of adenoid tissue on the removal of the latter the sinus condition clears up. I have always attributed this to the fact that the sinus condition results from improper breathing and abnormal congestion of the turbinates, interfering with drainage. On establishing proper nasal respiration the turbinates subside and the empyema gets better.

Dr. M. M. Cullom (closing): I have been looking for sinusitis in children a great deal more recently than I did eight or nine years ago. At the time I first saw this child I was not prepared to expect antrum suppuration in an 18 months old baby. I have had a good many acute cases in children, which have cleared up under treatment, but chronic cases like this are rare. I think Dr. Sullivan's point, *i. e.*, that we are apt to overlook these conditions in children, is well taken.

Foreign Body in Bronchus. Dr. Herschel Ezell.

Dr. Ezell reported the case of G. M., a white male, age 22 months, who was brought to him Dec. 10, 1924. Three weeks previous to this time the child developed a cold and cough which failed to respond to treatment. His family physician was unable to make a definite diagnosis, but suggested the possibility of a foreign body in the wind pipe and advised that the child be taken to a throat specialist. For three days there had been considerable wheezing and rattling, with paroxysms of uncontrollable coughing, worse during the day. For a day or two the rattling in the throat had been practically constant. The mother stated that a neighbor had given the child a handful of cracked hickory nuts about the time the trouble developed.

On examination the patient's face was flushed and the rattling in the throat was loud and constant. No rales were heard in either lung. Direct examination with a laryngeal mirror failed on account of the child's extreme nervousness. An X-ray picture revealed no foreign body, but showed that the lungs were free of pneumonia. Examination of the chest showed some obstruction in the right lung. A tentative diagnosis of foreign body, probably a piece of hickory nut, in the right bronchus was made and a

bronchoscopic examination was advised and carried out, the large short tube of the Kohler-Leiter instrument being used. This failed to reveal a foreign body, although the interior of the larynx and the upper part of the treachea were plainly visible. Feeling sure of the presence of a foreign body it was advised that the patient be kept under observation.

Two days later another bronchoscopic examination was made, one of the smallest Jackson tubes being employed. A foreign body could be seen at times in the right bronchus. Every effort, however, to grasp it with forceps failed. After several unsuccessful attempts a tracheotomy was done and an effort made to introduce the bronchoscope through the tracheotomy wound. This failed because of the presence of bloody mucus which was blown into the bronchoscope. A tracheotomy tube was thereupon inserted and the patient put to bed.

The following day Dr. Hilliard Wood was called into consultation and advised another attempt at bronchoscopy. The presence of a great many rales mainly in the right lung, was reported; the patient's temperature was 104⅕.° With Dr. Wood's assistance another examination was made, one of the smallest Jackson tubes being employed. Again the foreign body was seen in the neighborhood of the bifurcation of the trachea and again several efforts to grasp it failed. It was not deemed wise to attempt further examination and the patient was put to bed. He grew gradually worse and expired about 3 p. m. of the same day, Dec. 13.

DISCUSSION.

DR. HILLIARD WOOD: This child was in extremis when I saw him. I looked as long as I felt there was any justification for looking. I was never able to see the foreign body, although Dr. Ezell did see it. It was so small it would drop out of sight. The smaller the piece, of course, the harder it is to see it and the harder it is to pick it up when you do see it. This is just one of those tragedies that sometimes occur in tube work.

Cavernous Sinus Thrombosis. Dr. Jere W. Caldwell.

Dr. Caldwell reported the case of a white male, age 43 years, who while endeavoring to remove some hair from the left nostril, cut the skin. An abscess formed, which he picked. The nose and lip began to swell and a typical erysipelas formed. He had pain in the involved area, with high temperature. He was apparently improving when about ten days following the accident he developed frontal pain and edema of the left eye. The swelling increased, causing marked edema of the lids and the conjunctiva. The pain was so severe as to require an opiate for relief.

Examination Dec. 4, 1924, showed the following condition:

O. D. Slight edema of the upper lid.

O. S. Vision blurred. Patient stated that he could not see the light of the ophthalmoscope. Marked edema of the lids and conjunctiva. Skin in that area tender. On dilatation of the pupil the fundus showed tortuous veins and constricted arteries.

The temperature was typically septic.

A tentative diagnosis of cavernous sinus thrombosis was made.

The following day the edema in both sides increased. The patient was in a semicomatose condition, his temperature ranging from slightly above normal to 104.° Dr. Cayce was called into consultation and confirmed the above diagnosis. The patient died on the morning of Dec. 6.

DISCUSSION.

DR. M. M. CULLOM: Some years ago I saw a case which had been diagnosed as cavernous sinus thrombosis and which subsequently proved to be erysipelas.

DR. FRED HASTY: The interesting thing in this case is the rapidity with which the swelling developed in the second eye after it was noticed in the first eye. The case is plain on the surface. The swelling in the first eye arouses suspicion and then by watching the second eye the diagnosis is confirmed. I think Dr. Kennon's point, also, is well taken. Another interesting thing is the amount of edema developing in the upper lids.

DR. CALDWELL (closing): One thing in this case that established the diagnosis was the appearance of the eye grounds, *i. e.*, pressure on the nerve head, giving enlarged veins and some edema.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

FRACTURES OF THE MALLEUS.*

DR. DANA W. DRURY, Boston.

The protective function of the meatus is more important than any function it may perform in reflecting sound-waves upon the drum membrane. The membrana tympani is liable to a number of injuries from without. These, while not directly interfering greatly with the function of hearing unless at the same time they affect deeper parts of the organ of hearing, usually expose the mucous lining of the tympanic cavity to the direct irritation of the external air, by perforating the membrane, and thus lead secondarily to inflammation and loss of hearing.

The healthy membrane will usually resist these forces, but of course a membrane which in any way is diseased by fatty degeneration, atrophy, and by calcareous deposits, or one prevented from assuming proper equilibrium, by a closure of the Eustachian tube, is extremely liable to yield to external violence above named.

Anatomically, fractures of the malleus belong to the rarer injuries of the organ for hearing. They are generally caused by direct trauma on the tympanic membrane by introduction of hard bodies into the meatus, by severe injuries to the head (fractures of the base), or by extraction of foreign bodies that have become wedged in the external canal. The fractures generally heal by the formation of callus, or the parts remain ununited. In either case the inferior

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broken end forms an obtuse angle with the superior end of the handle. On examination with Siegle's otoscope, the inferior ununited end of the fractured handle shows considerable motion, while the superior portion remains stationary.

As the literature on this subject is rather meager, it has seemed worthwhile to make a collection of the case histories of those reported. To this summary of the literature we add a single case which came under my personal observation.

Politzer, in describing this condition, mentions in his book a case of fracture of seven years duration, caused by extraction of a foreign body. The point of fracture was in the middle third of the shaft, the lower fragment forming an obtuse angle with the upper part. The range for ordinary voice had dropped to almost nothing and since the accident the patient had stammered noticeably.

Burnett in his book on Diseases of the Ear mentions a case that he saw in the polyclinic in Philadelphia, showing a malleus from which the lower two-thirds had been broken off, by endeavors to remove a foreign body many years before. He stated that the membrane had grown around the short stump of the manubrium.

Ballenger also cites in his book a case with the handle fractured about 1 m.m. below the short process, and the two ends reunited in nearly or quite their normal position.

Toynbee showed in his famous collection a specimen from a man who was 72 years old. The membrana tympani was very concave, with broad bands of adhesions, which completely covered the incus and connected all the ossicula to the inner wall of the tympanum. The inferior extremity of the malleus had been fractured. It showed distinctly that it was partially separated from the long process. This specimen is labeled No. 630.

Hyrtl's case was that of a prairie dog. He states that the fracture was in the first part of the malleus shaft, .3 m.m. beneath the neck of the bone. That it healed by an annular knot of callus which surrounded the bone. There was slight displacement inward of the lower fragment, with an unmistakable angle in the shaft about 160° opening outward. Although his case is that of an animal his comments are worth considering. He states that since the fracture can only have been caused by force acting on the outer surface of the drumhead drivng it inward, the fixation of the shaft in the plane of the drumhead explains the displacement of the broken shaft to the side, and the downward displacement of the fragments is self-explanatory. No tear or swelling was seen on the drum membrane. Had these been present, indicating a greater force, the fragments

of the shaft would have been driven so far into the middle ear that union with the upper portion would have been impossible.

The cases recorded in the literature together with their salient features can be presented most succintly in tabular form:

Grouping the case histories in the manner in which the fractures occurred seems wise, as the cause is the same in many of the cases.

GROUP I—TWIGS ENTERING THE CANAL.

Meniere's case was that of a gardner, who accidently thrust a twig of a pear tree into his ear (side not mentioned). At the examination there was a very extensive laceration of the membrane and the lower end of the malleus. When the patient held his nose and blew air into his cheeks the remnants of the drum membrane and the end of the malleus could be seen to move. With very little treatment healing took place slowly. Meniere stated that the drum healed over without "any special aid from art". In the discussion of Davis' case Milligan mentioned that in his case following the fracture the two fragments became as one with a marked area of callus forming at the line of union.

GROUP II—FOREIGN BODIES.

Frankel's case was in a three year old girl who had pushed a pebble into her ear in playing. At first, attempt at removal was made, and later by a physician with the patient etherized. Both attempts were futile. The next day at the hospital an attempt was made as on the day succeeding. In spite of the asepsis used, meningitis appeared and death followed on the seventh day. The autopsy is of interest in that it showed at the inner portion of the left meatus a grey-yellow, stony body, between its edge and the bone a small fissure entered the skull cavity. The wall of the meatus was covered with fatty debris and tenacious pus. After chiselling away the roof of the tympanic cavity the parts were found filled with pus and lymph exudate. The ossicles were dislocated with respect to each other and the surrounding bony structure. The shaft of the malleus and the long shaft of the incus were separated, so that the former was directed toward the labyrinth wall. The head of the malleus showed a fracture of a hair's breadth. The tympanic membrane was wholly destroyed and the walls of the meatus lacerated. The stapes was separted from the oval window lying between the foreign body and the labyrinth wall, its head toward the mouth of the tube. In the region of the fenestra ovale an irregular quadrilateral bone fragment had separated itself. The foreign body was so firmly wedged that it could not be removed without damaging the skull.

TABLE 1

Reporter	Year	No. of Cases	Sex	Age	Type of Accident	Unconsciousness	Tinnitus	Vertigo	Deafness	Right Ear	Left Ear	Rupture Drum Membrane	Fracture Malleus	Suppuratio	Complications	Treatment	Autopsy	Remarks
					Group													
Meniere	1856	1	M	0	I	0	0	0	1	1	0	1	1	0	0	1	0	
Toynbee, J.	1857	1	M	72	0	0	0	0	0	0	1	1	1	0	0	0	1	Anatomical Specimen
v. Tröltsch, A.	1869	1	M	0	III	1	1	1	1	1	0	1	1	0	0	1	0	
Weir, R. F.	1870	1	M	32	III	1	1	1	1	1	0	1	1	0	0	1	0	Non-union
Hinton, J.	1874	1	M	0	III	1	1	1	1	1	0	1	1	0	0	1	0	
Sajous, C. E.	1879	1	M	19	II	0	1	1	1	1	0	1	1	1	0	1	0	
Bürkner, K.	1879	1	M	19	V	0	1	0	1	1	0	1	1	0	0	1	0	
Frankel. E,	1879	1	F	3	II	1	1	0	1	0	1	1	1	1	1	1	1	Meningitis Fatal 7 days
Steinbrügge.	1880	1	M	19	III	0	1	1	1	1	0	1	1	0	0	1	0	
Moure, E. J.	1883	1	M	20	V	1	1	1	1	1	0	1	1	1	0	1	0	
Eitleberg, A.	1885	1	M	38	V	1	1	1	1	1	0	1	1	1	0	1	0	
Kirchner,	1886	3	①M	23	IV	1	1	1	1	1	0	1	1	0	1	1	1	Multiple fractures
			②M	60	IV	1	1	0	1	1	0	1	1	0	0	1	0	
			③M	10	IV	1	1	1	1	0	1	1	1	0	1	1	0	Labyrinth Involvement
Hepburn, N. J.	1887	1	M	0	II	0	1	1	1	1	0	1	1	0	0	1	0	
Rohden, R.	1887	1	M	26	III	1	1	1	1	0	1	1	1	1	1	1	0	Labyrinth Involvement
Trautman.	1893	6	0	0	III	0	0	0	0	0	0	6	6	0	0	0	0	No history of the cases given
Pritchard, U.	1896	1	M	44	IV	1	1	1	1	0	1	1	1	0	1	1	0	Fractured Skull
Szenes, S.	1898	1	M	32	V	1	1	1	1	1	0	1	1	1	1	1	0	
Müller, R.	1898	1	M	61	III	1	1	1	1	1	0	1	1	1	1	1	0	Right Facial Paralysis
Packhard, F. R.	1899	1	M	39	II	1	1	1	1	0	1	1	1	1	0	1	0	
Allport, F.	1900	1	M	30	II	1	1	1	1	1	0	1	1	1	0	1	0	
Ruttin.	1908	1	0	0	V	1	1	1	1	1	0	1	1	0	0	1	0	
Davis, E. D.	1913	1	M	39	IV	1	1	1	1	1	0	1	1	0	1	1	0	
Total																		
	1856		M–21	3yrs.														
			F– 1															
22	1913	29	U– 7	72		17	21	18	22	17	6	29	29	9	8	22	3	

GROUP III—PEN HOLDERS AND HAIR PINS.

Sajou's case was seen in Turnbull's clinic. It was a teamster, age 19 years, who two weeks before had been injured by a pointed pen-holder penetrating to the bottom of the canal and perforating the membrana tympani. There was some dizziness and slight hemorrhage, but very little pain at the time of the injury. That night, however, he had excruciating pain accompanied by severe tinnitus. A few drops of strong nitrate of silver solution were dropped into the canal. During the third day the pain and tinnitus subsided with the appearance of a purulent discharge, which lasted for ten days. The auricle was red and slightly swollen and painful on pressure; the meatus was swollen and partially occluded and filled with whitish-yellow pus. The canal was so macerated that no details of the membrane could be seen. The Eustachian tube was involved, but strong blasts from a Politzer bag cleared the tympanum and caused the ear to whistle and produced much pain. After three weeks treatment, the details of the membrane could be made out, in the center of which was a crescentic rent involving about one-third of its diameter. Tympanic secretion oozed through this opening during forcible inflation. Each inflation caused a flap to swing out, and with it a small fragment of the lower portion of the handle of the malleus. This act caused sharp pain and a marked increase in the tinnitus. The treatment was suspended after the fourth week. An occasional inflation prevented adhesions of the fractured malleus and the torn membrane to the promontory. The hearing returned in three months time, while the appearance of the membrane was normal with the exception of the contour of the handle of the malleus and the light cone. The line of the handle could be traced to within a short distance of its end at the umbo. At the point of union there was some hyperostosis, but was probably the width of the bone out of its proper line. From the thickened point of union a narrow reflex extended, with its fan-shaped extremity toward the periphery of the membrane. With a Siegle's otoscope the membrana tympani could be drawn outward, and with it the handle of the malleus with its united fragment, while the increase in width of the fan-shaped projection of light proved the perfect action of the parts, which moved as a whole.

While in v. Troltsch's case seen a year after the accident the handle of the malleus assumed a peculiar position and it appeared uncommonly thick and prominent at a point immediately under the processus brevis, turning on its axis at this point when it moved. Packard's case recovered in six weeks following suppuration. The

two fragments healing at an angle of 45.° The hearing returned to normal and the tinnitus disappearing completely. The patient of Hepburn's, on the other hand, had almost complete loss of hearing, the drum healing but leaving the malleus handle apparently twisted upon itself. A false union was present, while in the uninjured ear a dislocation of the incudo-stapedial joint could be seen through an opening in the drum membrane.

GROUP IV—FALLS.

Kirchner's case was that of a suicide, age 23 years, run over by a train. He was thrown to side, suffering from numerous fractures. He died in twenty-four hours, the autopsy showing in the left ear a ruptured drum with a fracture of the malleus, the fragments separated .5 m.m. He explained the fracture by the blow to the zygoma and the transmission stress through the fibres of the drum membrane. The second case showed a longitudinal fissure in the drum with fracture of the malleus. No union took place, although the hearing seemed as good as before the accident. The third case was in a boy falling six feet, later on showing a callus at the point of the fracture. A labyrinth infection followed, destroying the hearing in that ear.

In Trautman's six cases he saw extensive callus formation in only one of them. On the other hand, in Rohden's and in Müller's cases some callus was noticeable, without mobility of the fragments. In Müller's case a facial developed and also showed a fracture of the external canal wall. Both cases recovered without undue loss of hearing and without disturbance to the labyrinth. In Allport's case following the suppuration, deafness and tinnitus persisted as well as the dizziness for a very long period of time. In Pritchard's and Weir's cases there was nonunion of the fragments. When the Valsalvian experiment was performed the fragments rotated and came into apposition in each case. Davis' case, while also a fractured skull, showed three months after the accident a small piece of bone attached to the drum, on removal, showed it to be the head of the malleus and two other smaller pieces that were removed seemed like the two crura of the stapes. There was no perceptible loss of bone conduction, the deafness being of the middle ear type.

GROUP V—BLOWS.

Moure's case received a blow on the side of the head, losing consciousness and bleeding from both ears. On recovery the patient was apathetic, although his general appearance was good. There was facial asymmetry, while the muscular strength was subnormal. The general sensibility was decreased, with hyperasthesia on the right

side of the face. The hearing was impaired, especially on the right, a loud voice being heard only close to the ear, the bone conduction through the skull was practically destroyed. The patient complained of extreme tinnitus, while walking with the eyes closed was very difficult indeed. The vertigo attacks were very violent, but without any gastric upset. The drum was thickened and adherent to the promontory, while at the incudostapedial area could be seen a laceration of the drum, and at the middle third of the malleus, with the use of Siegle's otoscope, much motion took place without any apparent callus formation. Eitleberg's case, on the other hand, three weeks after the accident showed a healed drum membrane and a callus on the handle of the malleus, the tinnitus only remaining, which was very bothersome. Hinton's case as well as that of Ruttin were quite simple, healing promptly without much disturbance to the hearing. Szenes' case, however, showed a rupture of the auditory canal wall. The case remained in bed for two months, dûe to the extreme vertigo, lapses of consciousness and marked headaches. Following the suppuration, a cicatrix formed, the malleal handle remaining in two unequal fragments. The fracture finally united, showing an obtuse angle at the point of union together with a calcereous deposit in the drum membrane. The hearing on the last examination had returned nearly to normal. Burkner's case showed a right angle of healing which was more pronounced when Siegle's otoscope was used. The drum was so thin that the shaft of the incus could be seen as well as the posterior crura of the stapes.

The report of the single case that has come under my personal observation is as follows:

Case 1. Mr. W. W., age 43 years, while hunting in the woods and passing through a thicket, a small branch of a sapling brushed his right ear, at the same time that he tripped to the right over an unseen obsrtuction. He immediately felt excruciating pain in the right ear and was conscious of an explosive like noise in his head causing distinct unsteadiness as he arighted himself. This disturbance forced him to sit down immediately so that he might relieve the nausea. He vomited twice within the next four hours, while the vertigo lasted with some abatement for several days. He had a marked tendency to go to the right unless he had a cane. On swallowing a peculiar hollow sound was noticeable and his deafness was very marked, but as he expressed it "there is so much racket in my head, I am unable to hear anything else".

The intense pain, together with the dizziness, caused him to ask me to examine his ear. This examination showed no signs of injury

to the canal, but did show clotted blood in the canal. The drum membrane was injected especially in the superior portion, while inferiorly running across the drum was an open perforation, the lower edge of which and just above the umbo showed a separate piece of the malleus. With Valsalva technique the edge of the handle appeared, while the edges of the perforation held by clotted blood. The tuning forks showed the Weber test localized to the right side, a negative Rinné, and the watch only perceptible in contact with the head. As I had his previous records I found that the loss of hearing was about 80 per cent.

The treatment that he received was absolute rest in bed, liquid diet, catharsis, elevation of the head to about 45,° the instillation of 10 per cent argyrol into each nostril several times daily, and caution to him not to blow his nose for the first 24 hours. The canal was wiped out with 70 per cent alcohol, dried with sterile gauze, a small amount of boric powder blown into the canal and a sterile wick, together with a sterile pad and bandage to the head. His convalescence was quite uneventful, the drum healing in two days without suppuration. The nausea and vomiting did not bother him following his return home, but the tinnitus lasted for several months gradually growing intermittent and finally ceasing altogether. Three months after the injury, with the Siegle otoscope, it did not seem to me that union was particularly firm although a callus was noticeable just above the umbo. Six months after the accident, the union was firm, but there was an appreciable obtuse angle between the united ends of the handle. The hearing had returned to about what it was previous to the accident, the Eustachian tube was patent and there was no apparent adhesion of the drum membrane to the promontory.

Generally the prognosis in these cases is very favorable indeed unless there are complications such as a fractured skull. As to the treatment, however, I believe that the least the case is disturbed the better the result will be. It is impossible to bring the fragments into apposition and to hold them in place. Consequently a small amount of dry powder insufflated into the canal, together with dry wicks, or no wicks at all, seem to be the best treatment. If the middle ear becomes infected dry wipes without the use of powder is the advisable procedure. Should the discharge become pus, then it would be necessary to syringe the canal carefully, followed by complete drying and dry wicks placed in the canal. Generally, however, the convalescence is quite uneventful.

SUMMARY.

1. The rariety of the fracture, as I have found only forty-four cases recorded in the past sixty-eight years.

2. The favorable prognosis; the simplest treatment seems to be all that is necessary to restore good function in a very short space of time.

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416 Marlborough Street.

CONTROL OF INTRACTABLE SINGULTUS (HIC-COUGH) THROUGH THE NASAL (SPHENOPALATINE-MECKEL'S) GANGLION.*

Dr. Charles Sixtus Rehfeldt, St. Louis.

The comparatively recent work of Sluder may be termed nasal neurology, especially the role played by observation and treatment to the nasal ganglion in and for various manifestations of intra- and extranasal disease and symptoms. I wish to add another striking result of cocainization of the nasal ganglion.

Peter D., age 32 years, single; occupation, tailor; height, 7 feet, 5½ inches; weight, 152 pounds; well nourished.

Previous Health—Suffered a slight attack of influenza in 1919, after which he had headache often of three days' duration, most often "lower half", left side. Two years ago headache disappeared without treatment. His history is negative as to G. C. and lues.

Present History—Patient consulted me Nov. 14, 1924. He had a feeling of malaise Nov. 12, 1924, followed by a distinct chill, also fever of about twenty-four hours' duration. Immediately after chill, singultus (hic-cough) developed. Patient complained of headache and pain of all parts of body with exception of hands and feet. Particularly severe was pain over sacrum. He had a sensation of burning in pharynx and larynx. He could not sleep nor eat on account of continuous hic-cough. Temperature 98.° Pulse 100. Blood pressure 120/70. Cardio-vascular—lungs: examination was negative as to localization of infection. Urinalysis negative. Bowel movement normal. Nasopharynx and larynx showed hyperemia. He had distinct hyperplasia of both posterior ends of middle and inferior turbinates, also of plica septi. Lingual tonsils were lobulated and hypertrophic. Hyperplasia of post-ethmoid and sphenoid area is present. Diagnosis, la grippe.

Treatment—Thinking the singultus due to gastroenteric functional disturbance plus possible toxemia, I gave calomel, rhubarb and soda. Patient returned to office Nov. 16 very weak and exhausted. He had had very little nourishment and no sleep for more than fifty hours, on account of continuous hic-cough. The nasal ganglions

*From the Laryngological Department of Washington University Medical School, St. Louis, Mo.

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were cocainized, waiting about ten minutes the hic-cough did not stop; I then inspected and found the hyperplasia had made a change in the contour of the posterior tips of the middle turbinates; a proper replacement of applicators showed marked and immediate cessation of hic-cough, which did not return. Patient telephoned next morning that hic-cough had not returned. Nov. 17, patient reports he slept most of the day. No hic-cough.

The advantage of stopping intractable hic-cough is obvious for all experienced medical practitioners; and especially by means of small cocain applications, instead of large doses of morphin, or other opiates.

Case 2: Mrs. E. P., white, age 42 years, was married twenty-three years. She has two normal children. Occupation, housewife. Height, 5 feet, 8¾ inches. Weight, 148 pounds.

Previous Health—Robust during infancy and childhood. Patient suffered much pelvic pain and discomfort, diagnosticated as ovarian inflammation and fibroid uterus.

The first attack of hic-cough occurred in March, 1924, without apparent cause, lasting from Thursday to the following Monday. The family physician was consulted, and after much medication and other treatment aromatic spirits of ammonia was finally given the credit for cure; its use in subsequent attacks was of no benefit.

Over a period of the last ten months, the patient has had attacks of hic-cough, the duration of which varied from 4 to 72 hours. There was no interval of freedom from hic-cough longer than seven days. The patient was under good medical and surgical care during this time and received treatment for, and at every recurrent attack.

Careful examinations were made and many consultations held. Patient was studied in several hospitals; all examinations revealed no pathology with exception of the pelvis as above stated. She got no relief. Relief was expected from surgery, and on Oct. 8, 1924, patient had the fibroid uterus removed under general anesthesia and part of one ovary resected. After the operation she had the longest respite from hic-cough—seven days. All manner of treatment was resorted to—manipulations, diet, drugs—subcutaneous injections of adrenalin, camphor in oil, ether, cacodylate soda, and various bacterial derivatives, atropin, opium, morphin, etc., intravenous injections of ether, camphor and also bacterial derivatives, the latter in such doses as to cause rigors and fever, in one instance it was followed by several hours unconsciousness and "near" death.

All this treatment was in vain with the exception of occasional relief from large doses of morphin hypodermatically.

Present History—Patient has been hic-coughing continuously for more than fifty hours, Dec. 4, 1924, to Dec. 6, 1924. The hic-cough on count was 24 to the minute. The patient received two hypodermics of morphin, Dec. 5, at 11 p. m., without relief.

She consulted me at my office Dec. 6, 1924. The usual physical examinations negative; pulse 72; temperature 98;° blood pressure 130/95. The present weight is 148 pounds. March, 1924, it was 172 pounds. Rhino-laryngological examination showed postnasal mucosa darker in color compared to anterior nasal mucosa. The lingual tonsil was hypertrophic.

Treatment—Having had such a remarkable result in Case 1, I tried to determine if cocainization to any other nasal areas or nerves would give relief. Bilateral cocainization of anterior ethmoidal nerves was made. After an elapse of 14 minutes (with the count of 24 hic-coughs to the minute), no diminution nor relief was had. Cocainization to the nasal ganglion was then made. After 4 minutes the hic-cough was not so violent, also the interval of hic-cough was lengthened (that is, the count was about 12 to the minute) and gradually decreased in severity and number so that at the end of 6 minutes hic-cough ceased entirely, and did not return.

May 20, 1925: Additional notes and observations in the case of Mrs. P. of intractable hiccough, are especially interesting and appended hereto:

Patient on account of residing sixty miles distant did not return regularly for treatment and observation until Feb. 25, 1925.

Patient was without return of hiccough from first treatment, Dec. 6, 1924, to Dec. 16, 1924. When hiccough returned patient was given hypodermic injection of 1 gr. of morphin by her local physician; this was repeated to stop hiccough, which also was a physical strain that kept the patient in bed most of the time.

Feb. 25, 1925. Patient returned with hiccough of 36 hours' duration; controlled by bilateral cocainization of the nasal ganglion.

Mar. 2, 1925. Treatment. No return of hiccough.

Mar. 12, 1925. No return of hiccough. Treatment—cocainization of nasal ganglion bilateral, and application of 50 per cent solution nitrate of silver to nasal ganglion area only.

Mar. 25, 1925. Patient returned; hiccough of 12 hours' duration; I also noticed acute inflammation and edema of area previously touched by 50 per cent silver nitrate solution of left side only; hiccough seemed greatly provoked by slight touch as applicator brushed over left nasl ganglion area; this treatment required thirty minutes for complete control.

Mar. 29, 1925. No hiccough since last treatment. Left nasal ganglion are a macroscopically normal. Upon passing applicator over left nasal ganglion area; this treatment required thirty minutes After cocainization was complete hiccough was again controlled. On account of the observation that the left nasal ganglion was sensitive to slight trauma in producing hiccough at will, I conclude to confine my treatment to this ganglion only.

Subsequent attacks of hiccough were controlled by treatment to the left nasal ganglion only.

Over this period of treatment, patient has had relief of hiccough no less than ten days and as many as twenty-one to thirty-one days between attacks. Since observing the extreme sensitiveness of this left nasal ganglion area the interest of this case has increased.

The injection of the nasal ganglion has therefore been postponed. The patient has gained in weight, health and strength.

It is interesting to know that in Case 2 the hiccough could be produced by mechanical irritation of the left nasal ganglion.

FOREIGN BODY IN ESOPHAGUS.*

Dr. Philip S. Stout, Philadelphia.

J. H., Philadelphia, age 3 years, white, male.

Family history: Mother and father living and well. Previous history: No illness. Chief complaint: Swallowed penny. Brought immediately to hospital, Aug. 25, 1924. Began vomiting. Heart and lungs normal. X-ray showed the position of the coin, in the esophagus just below the suprasternal notch. Efforts to remove the coin were made the same day but were futile.

Operation Aug. 26, 1924, Dr. Stout. With a Jackson's child-size esophageal speculum, combined with the direct fluoroscope examination, the penny was easily found and delivered by way of the mouth. Time, less than three minutes. The child left the hospital the next day. Pulse and temperature normal.

Medicine: Bicarb. soda gr. X, every hour for four doses; also, Morph. gr. 1/16; At. S. gr. 1/400, Hypd., one hour before operation.

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Comment: Doing this operation in the X-ray room with fluoroscope examination proceeding while the penny was found and grasped made the operation so easy that it was really a delight to do it. The esophageal speculum is one of the most remarkable of all the instruments that Dr. Jackson has devised.

Disadvantages in using the fluoroscope: The room must be pitch dark, which may frighten a child—and it is a little difficult to tell the condition of the child. A small flashlight helps to see the face. Again, you might come in contact with some part of the wiring or the apparatus and get a shock. Suggest not to move around too much in the dark and have everything ready before turning out the much in the dark and have everything ready before turning out lights.

Advantages in using the fluoroscope: Most foreign bodies in the esophagus are opaque or can be made so to the fluoroscope, so you can see when your speculum gets near the object; therefore, riding over it is not likely to occur—if it starts downward while you are inserting the instrument this also can be seen. You will not spend an hour looking for the foreign body that has gone down to the stomach. If there is more than one object this can also be seen. Finally you can see the object come up with the speculum, or, if it slips off, you can see it in its new position.

This is a method that any laryngologist can master and do in the hospital where there is a fluoroscope. No specially trained assistants, except the Roentgenologist, are required.

Note: Since the above was written we have used this method on another child, with a Red Cross button in the esophagus, just below the suprasternal notch—S. M., age 5 years, white, male.

Medical Arts Building.

PHYSIOLOGY OF THE TONSILS.*

Dr. David Nussbaum, Philadelphia.

It might seem at the first glance, that all that could have been told about the tonsils has been told, and that any further discussion of this subject is an unnecessary waste of time and energy; but this is far from being the case.

It should be emphasized, that in our own day, the clinical appearance of the tonsils is still the sole criterion and determining factor for their removal; the scientific aspect of the case being sadly neglected, or entirely overlooked. This policy has led to the indiscriminate enucleation, at sight, so to say, of any and every tonsil and brought the operation into some disrepute, so much so that some very prominent and dependable men speak of a massacre of the tonsils.

If it is appreciated that a tonsillectomy may at times assume the proportions of a major operation, and that most serious morbidity and even mortality may follow in its trail, it becomes obvious that careful consideration should be given this subject and precise scientific data should replace the subjective intuition of the examiner.

Three questions dominate the field of the tonsilar problem, namely: what is the function of the tonsil, if any; what are its relations to the systemic infectious diseases; and what are the end results of carefully selected, carefully done and postoperatively well treated tonsillectomies.

Until a satisfactory answer is given these pertinent questions, the tonsils will remain what they are today, an unsolved problem and the subject of endless discussion.

For a long time, investigators have endeavored to clear up the uncertainty surrounding the physiology of the tonsils. On the one hand they have ascribed to them many imaginable functions; while on the other they have considered them atavistic organs, without any function whatsoever.

Only in the last few years has this controversy, seemingly, been settled and some definite understanding reached.

The oldest known theories considered the tonsils to be a secretory gland, whose secretion contains: (1) either an amylolytic ferment to help digest the intaken food (Rossbach); (2) or plain mucus for lubricating the passing food (Bossworth); or (3) an inert fluid to moisten the inhaled air (Mink).

None of these theories have any standing in the light of our present day knowledge. The same applies to that other opinion,

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ascribing to the tonsils the function of aspirating the excess of saliva, tears and nasal secretions and returning them to the general circulation.

Another group of investigators maintain that the histological make up of the tonsils is the most important feature in determining their function, and they consider them blood building organs; for the reason that their parenchyma is composed of lyphoid follicles, with germinal centres, where mitotic changes are seen to take place. In this way, young white blood cells are continuously being born and thrown into the blood stream (H. Allen, G. B. Wood).

The premises of this theory are correct; young lymphocytes do originate in the tonsils—their number is larger in the hyperplastic, and smaller in the atrophic type—but what becomes of them is mere speculation. Most of them emigrate through the epithelium, to the free tonsilar surface and into the crypts; many remain in the parenchyma and a small number will find its way into the blood stream.

At any rate, the contribution of the tonsils to the white cells of the blood is so small as to be of very little value.

H. Allen is also of the opinion that the hyperplastic tonsil has an increased internal secretion, which works harm in the body of children, causing them to be below par mentally and physically.

Massini injected a tonsilar extract and claims to have observed a rise in the blood pressure; Scheier, doing the same thing, found a drop in the pressure; while Pugnat (Belgium) could see no effect whatsoever on same.

The next two theories to be mentioned lay the main stress on the clinical side only, and are for this reason of great practical value. The paramount questions being: are the tonsils able to guard our organism against infectious diseases, or do they help in spreading them?

One group of investigators represent the standpoint that the tonsils are acting as a first line of defense; while another large number of men take the opposite view, namely: they blame anything and everything on the tonsils, which they consider a great source of mischief.

Brieger and his pupil, Görke, are the originators and defenders of the so called defense theory. They claim: (1) that the tonsils possess a defense mechanism of their own, which renders them immune against infections, and (2) being situated at the most dangerous point, at the beginning of the alimentary and respiratory tract, they are in a position to act as guard against the invasion of infectious diseases, which otherwise would gain in intensity and in frequency, should the tonsils be absent.

As clinical proof Görke offers the fact that in childhood, where infections are at their height, the tonsils are mostly in a hyperplastic state, and, that after the human body acquires immunity against these very infections, they undergo a process of involution, as is the case in adolescent life.

Furthermore, it has been histologically proven that the normal tonsils absorb neither liquid, nor solid substances from the mouth, except when the epithelium of the tonsils is injured. Even in this contingency the penetrating substances or germs advance very little into the interior, on account of their being checked by the peculiar defense arrangements of the tonsilar parenchyma.

This mechanism consists of a lymph current—loaded with lymphocytes—running continually through the tonsil, from inward outwards, and in this way mechanically counteracting the onrush of germs, whose direction would be from the surface towards the interior; at the same time the phagocytic action of the leucocytes accomplishes the rest.

The existence of such a lymph current is purely hypothetical, reasoned out by the fact that the germinal centers produce only lymphocytes and no polynuclear leucocytes, and that these lymphocytes have no locomotion as do the former.

Since they penetrate the epithelium of the free tonsilar surface in such great numbers, as to even disrupt its continuity, there must of necessity be a stream present to move them along, otherwise there would be no possibility for them to reach the surface.

A number of objections have been raised against his theory, the most important being: (1) The lymphocytes do have an ameboid movement; it is much slower than that of the leucocytes, but none the less they are able to change their position and do not require a special stream to carry them; (2) their greatest number is found in the crypts, where—on account of their tortuous course—the pressure against the current is the highest; (3) nobody has as yet experimentally demonstrated the existence of such a current; (4) it could be argued that the infectious diseases of childhood are disappearing later in life, not on account of the acquired immunity, but on account of the involution of the lymphoid tissue. Or, to put it in another form, the reason that adults are less subject to tonsilar inflammation is due to the fact that the tonsils and the rest of the surrounding lymphoid tissues are undergoing a process of atrophy later in life.

Quite similar to this theory is the contention of some older and still more recent writers, foremost among them Schonneman, of Berne, that the tonsils are regional lymph glands draining the nasal cavities. They offer as proof the fact that after thorough treatment of the nose, the recurrent attacks of tonsillitis will subside.

The reason for so many hypotheses, each contradicting the other, though propounded by men of the highest standing, lies in the fact that the tonsils are segregated from the rest of the lymphoid tissue of the upper respiratory tract, treated as entirely different organs and special functions attributed to them which they do not possess.

The mucosa of the nasopharynx, pharynx, mouth and upper part of the larynx is infiltrated with leucocytes, either imbedded in the superficial layers as discreet masses, or protruding above the surface in the form of small, oval-shaped nodules or in conglomerations of the latter into sharply circumscribed bodies in the form of tonsils and adenoids. The entire complex of lymphoid tissue—in whatever form it appears—is called the lymphoid ring of Waldeyer.

The tonsils have long been recognized as a conglomeration of lymphoid tissue, but confusion arose from the fact, that having the same cellular structure as the regional glands, they were considered as such and theoretically given the same function. Piersol, classifies them with the patches of Peyer, and gives them an intermediary position between typical lymph glands and mere diffuse masses of leucocytes.

In 1920 Schaffer, of Vienna, was the first one to draw a sharp line of differentiation between the characteristics of the two, and has thus opened a new field of research into the physiology and pathology of the tonsils.

He drew attention to the fact that lymph glands are, without exception, interposed in the pathway of a lymph vessel, whose lymph they filter; while the lymphoid tissue of the upper respiratory tract, including the tonsils, are peripherally located and imbedded in the mucosa, close to its epithelial layer.

A typical, regional lymph gland will therefore have: (1) incoming stems, called vasa afferentia, to drain the particular region to which they are distributed, and (2) outgoing branches, vasa efferentia, for the purpose of carrying the leucocytes into the blood stream.

The tonsils, being peripheral lymphoid tissue, don't need and in reality have no such afferent vessels.

Lymph glands have a compact cortical substance, traversed by a system of channels in which the lymph is flowing; while the tonsils are in the main, invaginations of mucous membrane, called pits or crypts, around which is crowded the lymphoid tissue and the germinal follicles. Each pit with its surrounding lymphoid mass constitutes a unit, and a variable number of such units, separated by trabeculae of fibrous tissue, make up the tonsil.

It is therefore obvious from Schaffer's findings—which meet with general approval—that all component parts of Waldeyer's ring, including the tonsils, have no vasa afferentia. Consequently they are lacking the first requirement of a typical lymph gland, and therefore cannot be considered a filtering station. They are rather, owing to their peripheral location, to be considered the point of origin for the lymph current.

These purely histological findings have been subjected to a thorough physiological and clinical test by F. Schlemmer, of Vienna, with the object of correlating the anatomy with the experimental and the actual clinical facts.

Moribund patients, whose expectancy of life was considered almost nil, were injected with a sterile dye in the mucosa of the floor of the nose, septum and turbinates, also in the gums, hard and soft palate and both pillars; the specimens were examined post-mortem, and in every case the cervical glands draining this region, including the peritonsilar tissues, were impregnated with the dye, the single exception being the tonsils themselves.

The same line of investigation was followed out in the cadaver of recently demised patients, and identical results obtained, *i. e.*, the tonsils were found free from any dye particles, while everything around them was completely infiltrated with the latter.

Lastly, patients whose tonsils and adenoids were to be removed, were injected in the same way as mentioned above, and then operated upon at intervals of between six hours and three days. In the entire series of these cases not a particle of the foreign substance could be found anywhere in the tonsilar parenchyma; while the neighboring tissues and the regional cervical glands were actually swamped with the coloring matter.

From these paintaking and elaborate experiments, based on Schaffer's theoretical principles, Schlemmer draws the conclusion that neither the tonsils nor the rest of the lymphoid tissue situated in the nasopharynx, pharynx and mouth possess any incoming or afferent vessels, and cannot, therefore, be classed as typical regional lymph glands. Consequently, the assumption and teaching that they give protection to the human body, in helping to stave off infections is based on speculation, but not on real facts.

Another controversial issue concerning the tonsilar function was raised by the question as to where the lymph originating in the tonsils is flowing to; and here also two opposite viewpoints are holding the field. Some claim the direction is centrifugal, towards the mouth and pharynx, while the others hold that it is centripetal, towards the glands of the neck.

In 1914, Henke, of Konigsberg, published the results of his experimentations and reached the conclusion, that the tonsils are performing the function of elimination, of ridding the system of all foreign elements, carried to them by the centrifugally directed lymph current.

His findings were successfully disputed by other research workers, who pointed to the positive conclusions of prominent anatomists, that the tonsils are draining into the uppermost deep cervical glands. These are seated deep in the neck around the large blood vessels, at the junction of the common and internal jugular veins, corresponding topographically to the level of the horn of the hyoid bone, where it meets the anterior border of the sterno-cleido-mastoid.

The decision at issue is of great consequence, as it is important to know if the tonsils are helpful to the human economy, by ridding it of injurious elements, or if they cause harm by permitting the invasion and passage of virulent germs, as would be probable from the centripetal course of the lymph current.

Schlemmer has endeavored to answer this question by a series of experiments, which solve it in a most satisfactory and scientific way.

He selected patients who needed a tonsillectomy and injected his sterile dye between six hours and several days before the operation, prepared slides from the freshly enucleated tonsils and examined microscopically a great number of consecutive serial sections. A group of patients had their free tonsilar surface, only painted; in a number of others he injected under the epithelium of the free oral surface, while in many others, behind the capsule, in the same way as in local anesthesia. Lastly, he applied the same procedure to patients suffering from acute inflammation of the tonsils and from peritonsilar abscess.

The results he obtained are very interesting and in keeping with the anatomical facts already mentioned. In all cases where the injection was given under the epithelium and behind the capsule, the dye particles were traced in the lymph spaces of the fibrous septa and of the capsule. They could be seen taking a centripetal course towards their respective regional glands in the neck, which became infiltrated with the dye; while the epithelium of the tonsilar surface and of the crypts, the contents of the latter, and the lymphoid tissue of the tonsils themselves failed to show one particle of the injected dye.

The identical results were obtained in the cases where he dealt with inflamed tonsils, showing clearly that in health as in disease the lymph current is taking a centripetal course, under all circumstances.

Finally, where the dye was only painted on the surface, it could

be seen penetrating as far as the crypts, but not one granule pierced the epithelial covering, nor got further into the tonsilar tissue.

One more important question was waiting for an answer, namely: the relation of the lymph capillaries to the crypts. Schlemmer succeeded, after a series of technically very difficult and intricate experimentations, to demonstrate, that the tonsilar capillaries are a closed network, with blind cul de sac endings, without any opening into the crypts. Therefore, the possibility of a centrifugally directed lymph flow into the crypts and through them into the mouth is positively excluded.

On the clinical side, it has been observed, that in cases of malignant growth involving the nose, maxillary sinuses, hard and soft palate, gums, pillars and even the tonsilar capsule, the tonsils remain free from direct or metastatic involvement, like an island in the midst of a sea of carcinomatous masses, while the regional glands are affected very early in the disease.

We now come to the most popular theory of the day, the one which denies the tonsils any defense or resistance power, and on the contrary considers them the invasion point and transmission station for all sorts of infections.

Our daily clinical experience teaches us, that although the pillars and soft palate are exposed to infections to a not lesser degree than are the tonsils themselves, and although it is assumed that the latter possess defensive facilities against germs or their toxins; it is nevertheless an established fact, that they offer the first seat of predilection for such acute diseases as diphtheria, simple and Vincent's angina, primary luetc lesions and even for latent tuberculosis, as demonstrated by G. B. Wood.

But that they are guilty of being the portal of entry for the bulk of diseases, whose etiology is obscure, it is very hard to prove, indeed.

Truly, it has been found that in many diseases affecting our system, a certain particular type of germs could always be isolated from the tonsils. Diplococci and streptococci have been cultured from the tonsils in almost every case of articular rheumatism, and when injected intravenously into rabbits have caused a serous exudate in the joints. Furthermore, the germs found in acute follicular tonsillitis, acute articular rheumatism and in the blood cultures of such patients have the same identity.

Apparently, no better proof is required to show the connection between cause and effect. But it must not be forgotten, that we are also able to find on the healthiest tonsils—that never gave a day's trouble—a rich flora of all sorts of pathogenic germs, of various degrees of virulence. It has also been proven, that injections of bacterial cultures obtained from what were considered normal ton-

sils will cause a hyperemia of the synovia and cartilage in almost every joint in the body. Furthermore, all the histological and bacteriological investigations brought down to present day, fail to show the tonsils being penetrated by germs to any appreciable depth, nor are they able to demonstrate how these germs could get into the general circulation by the way of the tonsils.

It is therefore, just as plausible to state, that in systemic infections affecting joints, heart, kidneys and other viscera, with a preceding, concomitant, or subsequent inflammation of the tonsils, we deal with one and the same infection, caused by the same germ or germs. It is a general—somewhat milder—septicemia, where the tonsils are the first, or the simultaneous, or the subsequent manifestation in a series of consecutive local afflictions caused by the same infection.

It must also be borne in mind, that the tonsils cannot act in a different way from the rest of the surrounding lymphoid tissue, either in offense or in defense.

Should we translate this argument into practice, we could not speak of a thorough operation, unless the entire mucosa of the nasopharynx, pharynx and mouth is completely scraped away; a feat not even to be dreamt about.

We may, therefore, say, it has conclusively been proven: (1) that the tonsils are no regional lymph glands; (2) they afford our system no protection against infectious diseases; (3) they possess no mucous glands to help flush out the stagnant, irritant, and injurious material retained in the crypts; (4) nobody has experimentally shown what kind of function the tonsils have; (5) the defense theory is an ingeniously built up structure, but unfortunately mere speculation.

In conclusion, we must state that physiologically speaking, the function of the tonsils should not militate against their removal, whenever such a procedure becomes necessary. There is at present no evidence at hand to prove that such function is existing at all, except as a mere theoretical possibility.

But, whenever the question of focal infection arises, we must admit, that the relation of the tonsils to that particular infection, as cause and effect, is a very difficult problem to determine, requiring all the ingenuity at our command to have it solved.

While clinically, in a suspected case of focal infection, all the odds are against the tonsils; physiologically, they should at least be given the benefit of the doubt, and even granted a temporary suspension of their death sentence, for the purpose of a thorough-going investigation.

1024 Spruce Street.

FOOD IMPACTION IN THE ESOPHAGUS—A SIMPLE TREATMENT.

Dr. James E. Lebensohn, Chicago.

Food impacted in the esophagus produces psychical and physical distress; and constitutes an acute emergency. The removal by esophagoscopy is more difficult than with other foreign bodies. Rather than hazard trauma to the esophageal wall, many endoscopists prefer to push the food mass into the stomach. However, the armamentarium for esophagoscopy is not always readily available; nor the necessary endoscopic skill, for that matter. Fortunately both may be dispensed with in many of these cases; and reliance placed upon a hyperdermic injection of apomorphin, and the *vis naturae* for the expulsion of the mass. The idea, I believe, is original and in my experience the method has been safe, prompt and efficient.

Case Report: At 2 a. m., I was called to see the patient, a young man in a mild degree of intoxication. He had been eating liver, and a bolus slipped down his gullet, and remained impacted. The voice was good, and there was no dyspnea. Nothing unusual could be seen with the laryngeal mirror. A hypodermic injection of apomorphin gr. 1/10 was given. With the first retching movements the offending food mass was expelled: a liver chunk, triangular in form, two inches in diameter and an inch thick. The patient passed the night restfully, and in the morning felt as well as ever.

Many cases of injury to the face, nose and eyes are complicated with acute alcoholic intoxication. I have found it is less trouble in these cases to empty the stomach with apomorphin than with the stomach tube. After the vomiting movements are over, the sedative effect of the morphin element ensues.

25 E. Washington Street.

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TUBERCULOSIS OF THE TONSIL.

Dr. James Albert Morgan, Honolulu, T. H.

Primary tuberculosis of the tonsil is so seldom encountered, that the following report will be of interest. The case in question died of the pulmonary involvement, a fact which confirms the general opinion of the lesion always being secondary.

Good authorities believe bovine tuberculosis is the cause of many tonsilar and pharyngeal infections, especially in children, that in this type the disease occurs in the cortex and does not tend to ulcerate. There is not rarely pulmonary or systemic involvement but it may be associated with cervical adenitis. Differentiation between the human and bovine types is best accomplished by innoculation.

Wood is convinced that the tonsilar tissue of the throat is more liable to infection by tuberculosis than any other part of the upper respiratory tract. The tonsils are affected in nearly all cases of advanced pulmonary tuberculosis and over 5 per cent of all cases of hypertrophy of the pharyngeal tonsil are tuberculous in character.

A distinguishing point in the diagnosis of tuberculous ulcer of the tonsil is that it is exceedingly painful. It runs a slow course, its edges are smooth and the mucous membrane around it is pale gray without induration.

In the series of cases under my observation there was both laryngopharyngeal involvement as well as tonsilar ulceration in all but the one which at first was thought to be either tuberculosis or a malignancy.

M. F., male, Chinese, age 48 years; had for three months suffered moderate leftsided sore throat. During the last week the pain in the throat became so severe that food was swallowed only with the greatest difficulty. The left tonsil showed a deep ulcer involving the lower half and extending deeply into muscle posteriorly to tonsil. The glands in the neck of the same side were moderately hard and painful to pressure. X-ray at this time revealed some old healed lesions in both apices of the lungs. Patient recalled having had a bad cold and cough when a small boy. His father died of some throat affection at the age of 35 years. His mother is still living at the age of 84 years.

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Smears from the affected tonsil showed no tuberculosis.

Both tonsils were removed under local anesthetic and a prompt recovery was made. The swollen glands soon returned to the normal. The throat was seen frequently during the subsequent three weeks with no further evidence of the previous ulceration.

Three months later the patient returned with one large ulcer involving the entire left tonsilar fossa and an ulcer of the posterior pharynx. At this time an Einhorn tube was introduced for feeding and to relieve the patient from the effort of swallowing. During the first three days the tube caused distress and it was difficult to keep in place. The ulcers healed during this time and the general condition improved. During the fourth week in the hospital there was a general flareup of the tuberculous pulmonary process and the patient succumbed following a profuse pulmonary hemorrhage.

Feeding by lavage was tried in a number of similar cases with excellent results primarily. But all of the patients succumbed within a period of six weeks.

The microscopic examination of the tonsil in this case shows some idea of the topography of the specimen in the low power microphotograph. In this field very little of the true tonsilar tissue remains.

The higher magnification shows one of the few remaining germinal centers of the tonsil and immediately adjacent, a group of tubercles and multinucleated giant cells, with necrotic centers standing out prominently. In some specimens caseation and necrosis is seen but the tubercle bacilli have not been isolated from such infections nor has it been demonstrated in stained tissue specimens.

Room 48, Young Building.

VACUUM TONSILLECTOME.

Dr. Foster A. Beck, Allentown, Pa.

The vacuum tonsillectome was devised, in order, to overcome many of the difficulties and complicated techniques in doing a tonsillectomy. The use of this instrument will enable the surgeon to enucleate tonsils of any size safely and completely, with capsule intact, without injury to pillars or other structures under either local or general anesthesia.

The tonsillectome is made of *steel, nickel plated*, with vacuum cup or pyrex or glass. The instrument is well balanced and designed so as to give maximum strength with minimum weight. The instrument has fourteen parts. Vacuum cup, two clamps for holding cup in place, rubber washer for making cup with ring vacuum proof, canula with ring (two parts), needle, thumb screw for lengthening or shortening needle, catch on handle for holding needle in place, combined lock and ratchet arrangement for locking handles and allowing gradual enucleation when desired, trigger for releasing lock and controlling ratchet, handles (two halves), and removable pin for holding handles intact. The pyrex or glass vacuum cup enables the surgeon to see the tonsil in the cup. The canula is constructed so that when the needle is in place it is vacuum proof, and the distal end is designed so that the opening in the cup can be placed in three positions, right and left side, or up. The lock prevents the surgeon from drawing the snare wire tight, accidently, before the tonsil is in the cup. When the trigger is up, the instrument is locked, when half-way down in neutral position, and when all the way down in ratchet. The instrument can be held in either hand for removal of both tonsils. The vacuum cup prevents infected material from being swallowed or drawn into the lungs.

Can use this instrument for dissection operation by removing vacuum cup. With two vacuum tonsillectomes both tonsils can be removed in 15 to 30 seconds.

In order to do the operation quickly two vacuum tonsillectomes should be used. The opening into the cups should be in the desired positions, the needles threaded, with No. 8 snare wire, handles locked, and connected to suction pump apparatus by means of a suitable

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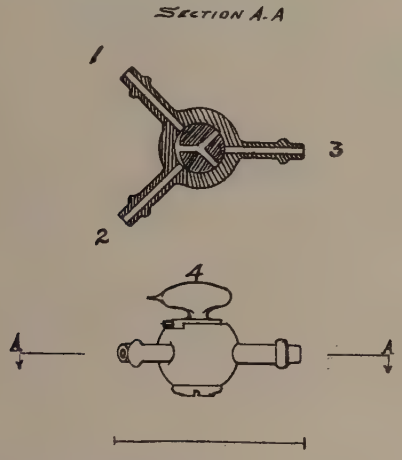
length of flexible rubber tubing. A combined three-way stop-cock and release valve (see drawing), should be attached to the tubing about 4 feet from vacuum cup. By using this apparatus both instruments can be attached at the same time, the vacuum changed from one to the other by means of turning valve to either side, and releasing vacuum by turning valve half-way. Have a small aspirating bottle connected to pump so as to collect blood or other secretions that may be drawn into the cup, otherwise the pump may be ruined.

Operative technique (general anesthesia). After the patient is anesthetized, proceed as follows:

1. Start suction pump apparatus and adjust headlight.
2. Lower head of patient, adjust mouth-gag, and turn head to side with face facing surgeon.
3. Use combined suction and tongue depressor to examine throat and clear same of all secretions.
4. With the free hand grasp vacuum tonsillectome, and under direct inspection pass the vacuum cup into the mouth, depress the

tongue with end of canula, turn handles so that the opening into the cup will be on an angle of about 20°, pass lower pole of tonsil to be enucleated into the cup, and then bring cup directly over the tonsil and press lightly against the pillars. If the tonsil is embedded, pass the cup directly over the tonsil and press lightly against the pillars.

5. Have nurse or assistant turn valve from release to vacuum, and tonsil will be drawn out of its bed into the cup; or if preferred to have suction turned on, step on tubing to cut off vacuum; by so doing, the vacuum is formed when desired by releasing foot from tubing. If only part of the tonsil is in the cup it can be disengaged instantly by turning valve half-way.



1 and 2 connect Vacuum Tonsillectome.
3, connect suction pump.
4, connect either 1 or 2 to 3. When 4 is between 1 and 2 vacuum is released.

Release lock by pushing down trigger with index finger of hand holding vacuum tonsillectome, and quickly tighten snare wire on the base of the tonsil and enucleate rapidly or slowly as desired. If the tonsil is to be enucleated slowly the vacuum should be released as soon as the snare wire is tightened on the base of the tonsil. The second tonsil is removed in the same manner as the first.

The combined suction and tongue depressor is used after removal of each tonsil and for removal of adenoids to keep the mouth and throat free from blood and other secretions.

Local anesthesia. Perfect anesthesia is produced by applying the anesthetic topically. The anesthetic used contains butyn 6 grs., and adrenalin 6/200 grs. dissolved in 10 c.c. of distilled water. Five

applications to tonsils, pillars, uvula and pharynx at 5 minute intervals are required. The operative technique is the same as for general anesthesia. The tonsil should be enucleated rapidly. After the tonsils are removed, glyceritum acidi tannici should be applied to the fossae to prevent postoperative hemorrhage.

ADVANTAGES.

1. The use of this instrument will enable the surgeon to enucleate tonsils of any size safely and completely, with pillars intact, without injury to other structures and without using any other instruments.

2. The pyrex or glass vacuum cup enables the surgeon to see the tonsil in the cup. If only part of the tonsil is in the cup it can be disengaged instantly, without injury to the part, by releasing vacuum.

3. The lock prevents the surgeon from drawing the snare wire tight, accidently, before the tonsil is in the cup.

4. The vacuum cup prevents infected material from being swallowed or drawn into the lungs.

5. With two instruments both tonsils can be removed in 15 to 30 seconds.

6. Can use this instrument for dissection operation by removing vacuum cup.

7. The three-way stop-cock is designed so that the vacuum can be released instantly by turning valve half-way.

Note: The instrument is made by Geo. P. Pilling & Son Co., Philadelphia, Pa.

402 Hanover Avenue.

VACUUM FRONTAL HEADACHE.*

Dr. Louis R. Effler, Toledo, Ohio.

The causes of headaches are legion. We recognize headaches of renal, intestinal, or general disease origin; intracranial, gynecologic, and neurologic headaches; ocular, dental, nasal, and several other varieties. The keen diagnostician, who looks for the *cause* in each case of headache, will score the biggest percentage of successes. In a word, headache is a *symptom* that will resist any but symptomatic treatment until the cause is found.

A number of years ago, Sluder called our attention to the existence of what he called "the vacuum frontal headache". He emphasized that this type of headache was usually frontal, low-grade, and made worse on the use of the eyes for close work. He further emphasied that these noses contain no pus and no pathology to the casual (and often careful) examination. His explanation is: that obstruction to the inlet of the frontal sinus causes its contained air to be absorbed and a "vacuum" to be produced. This negative pressure causes a low-grade headache. He explains the asthenopia by saying: the superior oblique muscle attaches to the floor of the frontal sinus, which is its thinnest portion: any use of the eyes for close work causes a pull on the attachment of this muscle with eye strain. This point of attachment of the superior oblique muscle is called "Ewing's point". Tenderness on pressure over this point is diagnostic.

The writer freely confesses that he read Sluder's monograph at least five years ago. At that time, a mental note of the existence of this condition was made and filed away for future reference in the usual pigeon-holes of the brain. The impression made (for no reason of the author's) was that this was a "rara avis" that might some day cross our path and would be recognied when it did. Peculiarly, this delusion might still be persistent if it were not that Fate placed one of these cases in our own household. The awakening came suddenly like an inspiration.

We had been pursuing the notion that a frontal sinus is rarely involved alone. It always seemed to us that the ethmoid is involved primarily and the frontal secondarily. In our own mind, we had

*Read before the Eye, Ear, Nose and Throat Section of the Toledo Academy of Medicine, Jan. 30, 1925.

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classified the type of headache produced in these nonsuppurative cases as "fronto-ethmoidal headache". We are now convinced that it is identical with Sluder's "vacuum frontal".

This type of *headache* is not to be confused with the *pain* of an acute suppurative frontal sinusitis. In the former, it is a *headache*, bearable, though chronic and severe; in the latter, it is a *pain* almost unbearable until relieved spontaneously or by operation. In the one case, we have the picture of a patient *asking* for relief; in the other, we have the picture of a patient *demanding* relief.

It is not our purpose to swing the pendulum to the extreme of placing every headache, especially every eye-headache, in the "vacuum frontal" class. Our purpose is merely to call the fact of their existence and frequency again to mind; and urge a more searching examination and diagnosis with them in view.

In going over our records for this study, we note that during the past two years we have had exactly 125 cases of Frontal Sinusitis of all kinds. Of this number, there were thirty-five cases of undoubted "Vacuum Frontals". This would seem to indicate that in every three to four cases of Frontal Sinusitis, there is one case of the vacuum type. If this proportion holds constantly, one may readily see that we are confronted with this type of headache rather more than frequently.

How many of these are diagnosed by the average practitioner? Very few, if we are to judge by the amount of "headache-medicine" that has been given; or the numbers of teeth, tonsils, etc., that have been recommended for removal. It is not our purpose here to make game of the general practitioner. He has had long enough to take the brunt for all the sins of omission and commission in medical practice. It is safe to say, however, that very few, if any, vacuum frontal headaches are recognized.

How many of these headaches are diagnosed by our specialists? We are the men who should recognize them if anyone should. We know that this symptom-complex exists and are in a position to distinguish this from other types of headache. The peculiar thing is, we do not. If we are to judge by the number of lenses prescribed for this type of headache, it would seem that the casual pathology is overlooked. In other words, these cases pass through the hands of our specialists as well as our general practitioners too frequently without receiving their just meed of recognition.

It is necessary to diagnose them. If they are not diagnosed correctly, they seldom improve spontaneously. Their tendency is steadily though surely to increase. The usual history is that over a period

of two, five, ten, fifteen, twenty, or more years the patient has suffered from headaches and has succeeded in getting no relief for them from any doctor or any remedy that has ever been tried. The patient has given up hope of ever getting better. He has adopted the very philosophical attitude of suffering in silence or has become completely neurasthenic. Friends have run the gamut from sympathy to callousness. They have heard the cry of "wolf" so often and still see the patient living, that each attack is just another one of "John's or Mary's usual headaches".

Let me quote briefly a few case-reports to illustrate the usual symptomatology:

Case 1: Miss G. B., age 47 years, milliner. This patient has had headaches for the past ten years at least. These were very severe in type and notably more severe on right side. Patient was forced to go to bed for several days at a time. No headache-medicine ever relieved. Engagements had suddenly to be canceled due to the suddenness of onset of these headaches. Often, they would leave as suddenly as they began. The eyes were weak and always under suspicion as the causative factor in these headaches. A well-known oculist was consulted on several occasions over a period of years. Lenses were given and changed, but at no time did the eyes give unimpaired service. Her work became torture and her occupation changed frequently. She became a chronic headache-sufferer.

Peculiarly, this patient also suffered attacks during the past few years of nausea, gastric pain and fullness, etc. (on the average of every six weeks); this was diagnosed as a gall-bladder disease.

On June 4, 1923, a middle turbinectomy and antethmoidectomy were performed. Except for a high septal deviation, right, no pathology was found.

Since her operation, the patient has gained ten pounds in weight. All her symptoms have improved—this not only refers to her headache and eyestrain, but also to her gall-bladder symptoms. She has had two headaches since operation and two gall-bladder attacks; both of these coincident with colds in the head and abortive attempts at a re-establishment of her old ailments.

She says: "Things that were irksome before, I do now without complaint. Altogether, I am a different person."

Case 2: Bishop S., age 35 years. The onset of trouble dates back at least five years. At this time, the first symptoms were those of asthenopia. In spite of a very careful refraction by the head of the ophthalmology department of our largest southern university, lenses

permitted close work for no longer than one-half to one and one-half hours at a time. During the past year this condition became much more aggravated.

Patient found himself unable consistently to perform the duties of his office. Deep concentration produced great reaction. Insomnia and nausea were frequently. Sheer will-power became the driving force. Any collateral reading was out of the question. A neuritis developed in the left arm. The left side of the body, including arm and leg, would become numb, etc. In a word, patient was losing his grip and becoming a confirmed neurasthenic.

This mental condition was improved not at all by a complete overhauling at the Mayo Clinic. No solution was offered beyond a recommendation for the removal of a few doubtful teeth. Subsequently examination by several well-known specialists in Chicago also drew blank. The patient's local physician had seven teeth extracted and recommended a tonsillectomy.

Acting almost entirely upon suspicion, we did a left middle turbinectomy and exenteration of the antethmoids (Sept. 26, 1924). No pathology before operation. At operation, a hyperplastic ethmoiditis was found.

Though the elapsed time since operation is very short, the patient already knows he is well. His headaches, etc., are a thing of the past. His asthenopia has almost entirely disappeared.

A mild recurrence of all symptoms developed with the onset of a coryza recently. But all symptoms faded as the latter responded promptly to treatment.

Case 3: Mrs. Helen C., age 31 years, housewife. Patient has had headaches, especially right side of head, for past five years. These have become much worse during the past year.

At onset of trouble, wore lenses for headache but soon found they gave no relief. Asthenopia was very prominent. Photophobia, lid-fluttering and tearing were so severe that patient invariably sought refuge in bed and in darkness. No medicine ever gave any relief. The headaches would seem invariably to accompany any little excitement as the entertaining of guests or preparing for any little social function a few days distant.

On June 15, 1923, a tonsillectomy was done. Patient gained about ten pounds in quick fashion but experienced no local effect on headaches.

On Aug. 31, 1923, an abscessed tooth was extracted. No appreciable result followed.

Meanwhile patient was becoming more and more discouraged. The headaches were increasing. Her nerves were very much frayed. Her impatience with those around her on most trivial grounds was remarked on many occasions. Her hair, especially on the right side, became prematurely gray.

On May 31, 1924, with no visible intranasal pathology, we performed a right middle turbinectomy and antethmoidectomy. No pathology was encountered.

The result of the operation has had the effect of ameliorating practically every symptom. The effect has not been magical in her case, but improvement has been steady. Recently, a headache accompanied a coryza but disappeared with one treatment.

A further illustration by cases would be fatiguing and pointless. These serve to show the outstanding features of headache with asthenopia, that become increasingly severe, and ultimately wreck the nervous systems by their constant nagging and failure to obtain relief. "Gutta cavat lapidem non vi sed saepe Cadendo."

It is true that headache (or preferably *pain*) and asthenopia accompany the suppurative type of Frontal Sinusitis. But fortunately the very severity of symptoms and the presence of numerous signs to establish a correct diagnosis lead to prompt relief. In the "vacuum frontal" types, there are *symptoms but no corroborative signs* that cannot be explained on pure neurosis grounds. The result is the patient may go many months and even years before the causal pathology is suspected.

Anatomy: The anatomy of the middle meatus is the key to the whole problem. In its simplest terms, the frontal sinus opens into a funnel-shaped infundibulum, which then carves a groove (hiatus semilunaris) that passes downward directly between the uncinate process in front and the ethmoidal bulla behind. The frontal sinus is an air-chamber normally, the atmospheric pressure of fifteen pounds to the square inch outside and inside the sinus is maintained.

Pathology: Anything that tends to disturb this equilibrium in atmospheric pressure is a cause for trouble. In the suppurative types, pressure is built up within the sinus to exceed the fifteen-pound per square inch ratio; hence we have untold pain. In the "vacuum type", pressure within the sinus is reduced to a vacuum by the absorption of its air into the blood: hence we have a bad headache which is made much worse by the use of the eyes.

It is unnecessary to go into the numerous causes or anatomical quirks that spell an interference with proper ventilation of the frontal sinus. The dissections and plates of the old masters, like Killian,

Zuckerhandel, Hajek, etc., etc., are very illuminating. They show numerous abnormalities and anatomical distortions. The inlet of the frontal sinus may be pin-point. The infundibulum may be horizontal or sharply angled instead of vertical. Ethmoid cells developmentally may encroach upon the infundibulum or hiatus semilunaris from above or the side or the front or the back. The bulla itself may be abnormally developed. The uncinate process may be unusually prominent. Deviations of the septum, especially those high up in the middle turbinate region, may cause pressure on the mid-turbinate to flatten it against the structures of the middle meatus. It is necessary for the middle turbinate to hang free in the nose, *i. e.*, it must be away from the lateral nasal wall and not in contact with the septum. It is interesting to note that in these thirty-five cases, no less than twenty-five were found with high septal deviations on the side of the trouble (71 per cent).

Peculiarly, we may get trouble in the side opposite the septal deflection. The compensatorily hypertrophied middle turbinates in these cases serve in the same way as obstructions to the middle meatus. In this series of thirty-five cases, there were ten of this type (28 per cent). It is impossible always to state the factors that disturb this fine sense of balance or patency necessary to equilibrium.

Treatment: From a conception of the anatomical distortions that cause this condition, topical applications of any kind are at best palliative. The logical treatment becomes therefore one of surgical removal of obstructions. Each case will be a law unto itself. At times a correction of a high septal deviation with fracture of the middle turbinate away from the lateral nasal wall will suffice. At times, the mere fracture of the middle turbinate away from the lateral nasal wall will be all that is necssary. At times, a middle turbinotomy or turbinectomy will be necessary. Our usual practice, however, is a middle turbinectomy with an exenteration of the anterior ethmoid cells. This seems more logical because it gives free access to the frontal.

Recurrences: The question of recurrences constitutes to my mind an important chapter of this subject. It is too often neglected. The natural presumption is that once the diagnosis is correctly established and the operative treatment instituted that the case is *cured*. Many of our authors write "Finis" at this point.

This is like the average novel. The first 249 pages are spent in bringing the lovers together, and the 250th ends with their "living happily ever after". But is this the final chapter? We confess a curiosity at times to know whether they stay happily married.

In the same way it is interesting to know whether these frontal sinuses stay *"cured"*. Despite operation they do not always "pursue the even tenor of their way". We must remember that they are "loci minoris resistentiae". Anything that produces a local engorgement in the nose can block off the opening of the frontal sinus, rarify the air in the sinus, and reproduce "vacuum" symptoms. Fortunately, this does not occur often; and if it does, the symptoms are never so severe nor so prolonged as originally. They may call for treatment, however. The patient easily becomes neurasthenic.

In this connection, it may be interesting to note that the taking of alcoholic drinks is a factor in producing postoperative (and anteoperative) frontal headaches. In a number of instances, and more than once in the same case, this phenomenon has been borne in on us. The headache will last just as long as it will take to dissipate the effects of alcohol from the system.

CONCLUSIONS.

1. The "Vacuum Frontal" headache is a definite entity. It is usually frontal, unilateral, low-grade, paroxysmal but tending to become chronic, and made worse by the use of the eyes.

2. It occurs fairly frequently.

3. Treatment is usually directed against the eyes, the teeth, tonsils, etc., with little or no relief. Hence, the need for correct diagnosis and treatment of the causal pathology.

4. The noses in these cases are to all intents and purposes negative and therefore mislead the observer.

5. Recurrences will take place occasionally even after operation, due to alcohol, coryza, etc.; but these usually respond promptly to palliative treatment.

THE END RESULTS OF TONSILLECTOMY.

Dr. H. H. Amsden, Concord, N. H.

This paper will not attempt to discuss the indications for, or technique of, tonsillectomy, except in so far as these factors may influence the end results of the operation. It is of course true that marked post-operative deformity is not incompatible with unimpaired functions of talking and swallowing, yet the end for which all surgeons seek is a throat free from tonsillar tissue, with intact pillars and soft palate. There are two principal factors which determine this result: absence of acute infection in throat at the time of operation; and an operative technique which causes the minimum amount of trauma.

1. Operation in the presence of acute follicular tonsillitis, peritonsillar abscess, etc., is not good surgery. In the presence of acute infection no walling off or limitation of the process can take place. Removal of the tonsils opens up a wide field for absorption. The swelling and tissue engorgement render it difficult to remove the entire tonsil, and necessitate an undue amount of trauma. The inevitable post-operative reaction and infection prolong the period of convalescence, increase the patient's discomfort, and cause an undue amount of contraction and scarring of the throat. There is an increased risk of systemic infection, embolism, pulmonary abscess, etc.

Operation in the presence of acute infection is very apt to be followed in a few hours by a sharp chill, rise in temperature, etc., which generally subside with equal rapidity, but are always followed by wound infection, which in turn influences the end results as already indicated. A possible exception to the above rule may be made in case of Vincent's angina, limited to the tonsil, which does not respond to treatment, yet operation under these circumstances is frequently followed by infection of the wound by the specific organisms.

2. Avoidance of operative traumatism. Today the great majority of tonsillectomies are done by one of two methods: the Sluder, or some of its modifications; and the snare. That most tonsils can be removed more quickly by the Sluder method than in any other way is unquestionable; that it has any other advantages over the snare is at least debatable. The real test of any operation is not its

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speed, but the end results, so far as clean removal of tonsils, absence of hemorrhage and injury to the throat are concerned, and throat surgeons should check up their results by this standard, rather than by a stop-watch. The fact that so many modifications of the Sluder technique and instrumentation are being promulgated makes one who has never departed from the old-fashioned snare question whether the last word has been spoken in tonsil surgery, and whether the advocates of the guillotine are entirely satisfied with their results.

One of the annoying accidents which frequently occurs during tonsillectomy is the stripping of the mucous membrane from anterior pillars or uvula, or the more or less complete amputation of the posterior pillar. These accidents can be avoided only by carefully severing the mucous membrane connecting the tonsils to the adjacent structures, which should be done by sharp knife or scissors, and need occasion no injury to uvula or pillars. After the loop of the snare has been applied to the separated tonsil, at least one minute should be devoted to tightening the snare, as this allows time for clotting in the divided vessels. When the separation is completed, without removing the tonsils from the fossae, they should be held in place for one or two minutes. This is a most valuable hemostatic measure, and reduces bleeding and traumatism of the throat to a minimum and in at least 75 per cent of all cases no other hemostatic measures are necessary. The writer is convinced that the adoption of this procedure will do more than anything else to lessen postoperative swelling and infection of the tonsillar fossae. If bleeding points appear after the removal of the tonsils, it is best to catch them with curved artery forceps. Repeated sponging or applications of the suction tube directly to the tonsillar fossa increase bleeding rather than lessen it, and are seldom necessary. A bleeding vessel which requires ligation can best be controlled by passing a curved needle around the vessel, carrying an absorbable suture. This is not a difficult procedure in the great majority of cases.

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SOME PHASES OF THE TONSIL QUESTION.

Dr. H. D. Newkirk, Anaheim, Calif.

There is probably no subject, especially among nose and throat men, so hackneyed as the tonsil question. Much has been written and usually when it is all summed up the same ground had been covered in practically the same way by all writers. It is our purpose in this paper not to cover the whole field of the tonsil question, but to enter into a brief discussion of some phases which appear to us to be lightly touched upon and which have seemed of considerable importance.

Diagnosis: First, in regard to the diagnosis of infected tonsils. The following answers to a questionnaire on this point show the wide difference of opinion and emphasis placed on various symptoms:

1. How do you determine whether or not tonsils are infected? Inspection 8; history 8; judgment 1; culture 6; pus in crypts 19; congested pillars 7; pain 2; hypertrophy 2; cervical gland hypertrophy 9; lymphocytosis over 40 per cent 1.

So the question arises—when is a tonsil infected sufficiently for removal? First, it is our custom to consider the history of the case. Has the patient had frequent attacks of tonsillitis or quinsy? If he has, even though the attacks be remote, we believe we should consider the tonsils diseased until they can be proven otherwise.

Second, in regard to the cervical glands, if the glands are enlarged and have been so for a considerable period and there is no other evident focal infection in the region of the head, we infer that the tonsils are diseased, especially if there has been a previous history of tonsillitis. Of course, at this point we must differentiate causes and must not be in a hurry to connect large cervical glands with supposedly diseased tonsils simply because the glands in the neck are enlarged. We must always think of syphilis, tuberculosis, infected teeth and bear in mind Hodgkin's disease as well as other rare diseases of this region, such as carcinoma or sarcoma, but if these diseases can be excluded, then the evidence would point toward the tonsil as the cause of the enlarged gland, especially if we have concomitant anemia and high white count unexplainable by other causes.

Third, direct examination. Size alone is not ordinarily sufficient evidence for removal; however, a large tonsil usually contains infec-

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tion and every effort should be made to find that infection. It is our custom to consider one or two points in the local examination of a tonsil; first, the tonsil itself. Is it full of crypts? Does it look boggy? Can cheesy material be extruded on pressure or can fluid pus be expressed? Cheesy material without odor is doubtful evidence of infection. Fluid pus with odor is a positive evidence of infection, and it is in these cases that enlarged cervical glands are found, especially in children with anemia and malnutrition, or in an adult, rheumatism, endocarditis and other diseases which commonly follow a real focus of infection.

Fourth, congestion of pillars. We believe that a tonsil that is not infected will show pillars that are not more congested than other regions in the throat, but red, angry pillars are usually evidence of deep tonsil infection and we have found that firm pressure on the anterior pillars will usually bring a considerable quantity of purulent material to the surface.

Fifth, history of diseases caused by focal infection. If on a thorough examination we find no pus can be expressed from the tonsil, the pillars not even congested, the tonsils small in size, and the history negative as to previous tonsillitis, with systemic infection commonly supposed to follow tonsil infection, we would advise the tonsils to be removed, as for instance, in cases of gastric ulcer, pyelitis, cholecystitis, and other lesions definitely known to be caused by focal infection. If other causes can be reasonably excluded, even though the tonsils appear negative, we advise removal, and it is only too often, in such cases, that our pathologist reports streptococcus, either viridans or hemolyticus.

Prognosis: The question often comes up when we see a tonsil that does not look quite normal, yet no definite evidence can be found to warrant a positive statement that the tonsil is infected, as to whether that tonsil should be removed and if so, what the result will be. A patient may have evidence of focal infection, such as rheumatism or endocarditis, and we in our own mind feel quite sure that the tonsil is the source of that infection, even though we cannot demonstrate this fact to the patient, and even though no other evidence can be found to account for the trouble. We would like to tell such a patient that if the tonsil is removed he will be relieved of his symptoms, as he ought to be if the tonsil is the direct cause and sole source of his trouble and the condition has not gone on so long that secondary changes have taken place. However, we have never yet been able to feel certain enough to speak positively on this point and it would seem that a real piece of original work could be done

along this line. Patients are interested in knowing about the end result and their inquiry frequently is: "Do I have to have this piece of surgery done and if I do have it done will I be improved with respect to certain definite symptoms?

As to the first query do they have to have it done in order to get improvement, or ward off impending systemic infection? It is very strange, but many times we see people with grossly infected tonsils or a disgusting pyorrhea living to a ripe old age and suffering nothing from these diseases. At other times we will find patients with a very slight infection, such as an apical abscess on a tooth root and the direst consequences follow. Just why this should be, we do not know and it is for this reason that we do not feel very certain in advising a patient that a definite infection must be removed if he expects to be cured of a systemic condition and if he would prevent the end results which his friend may have had from a similar focus. If we were able, then, by locating a focus of infection, and knowing what that infection will do in some patients, to state positively what it will do in all patients, we would have a much clearer conscience about advising surgery of the tonsil, than we do now.

In order to work out this problem satisfactorily, much work will yet have to be carried on along the lines of a study of resistance and selective foci for it would seem to us that causing the existing pathology, are many unknown factors, doubtless, of which no note is taken, and these factors will have to be discerned if we are to get to the bottom of this problem. The question of resistance versus the pathology is evident in other lines besides infected tonsils as, for instance, in visceroptosis, or Glenard's type of individual. There are many women with the colon down to the brim of the pelvis with no symptoms whatsoever resulting from this ptosis, others with nephoptosis and no symptoms, others with a lacerated cervix and a relaxed perineum and no symptoms, while others who are more neurotic or with less resistance will complain of many symptoms from ptosis of the gastro intestinal tract, a prolapsed kidney, or a torn perineum, and we cannot set this aside by saying that it is simply a neurosis due to highly developed city life. We feel that there must be some definite factors in the makeup of every individual which it will ultimately be possible to measure accurately, which when added together, will be known as his resistance, and in advising surgery and offering a prognosis in regard to this surgery, or the necessity for same, we will in every case go thoroughly into all these factors, some of which we have mentioned. At the present time we have no other alternative except to say if a tonsil is infected it should be removed

for it may cause trouble (we cannot say for sure that it will). Another factor of equal importance will be a selective study of the various foci in order to determine which ones are active and what their various relations may be to the symptoms in question.

For some time I have felt that more detailed study and investigation should be made of the tonsil question in its relation to systemic infection. The fact that the general principle of focal infection is well established, that in certain instances the tonsils have been the particular foci causing systemic infection, such as rheumatic and arthritic conditions, proved by the fact that the systemic disease was entirely relieved following complete tonsillectomy, has perhaps led us rather hastily to conclude that all tonsils showing cryptic debris or other evidence of infection should be removed, and if properly removed would clear up the rheumatic or arthritic condition. One does not have to be in practice long to learn that this is not always so, even when the most painstaking and thorough examination has been made by a competent internist, and a perfect tonsillectomy done. The longer one has to deal with these questions, if he is conscientious and follows up his cases, the more he will wonder if there may not be some factors of prime importance which are still unsettled or perhaps not even seriously considered.

A recent article along this line in the *Journal* of the American Medical Association by Alvarez, is very illuminating. He shows that the results obtained by removal of tonsils in adults for certain chronic systemic conditions are, to say the least, very disappointing. It may be that a good many of the patients mentioned in his report, since they came to him from scattered sources, had had tonsillectomies done elsewhere on hurried or immature advice. Yet there remains the fact that tonsillectomy was done in certain instances on the grounds that the tonsils showed infection, and for the purpose of remedying a systemic condition with no improvement. It is also possible that certain of those in the rheumatic or arthritic group who were benefitted by tonsillectomy had some other treatment, such as extraction of infected teeth, physiotherapy or climatic advantages which may have been the beneficial factors, rather than the tonsillectomy. Also it may be, and doubtless is true, that in certain instances where the tonsil may have been the original focus, the case may have been of such long standing or become so general in its spread that new foci developing from the original tonsil are now the direct cause of the symptoms rather than the original focus. Or that had these same patients who reported improvement by tonsillectomy taken the Abrams or Christian Science treatment, they

might have reported as favorably. Statistics, especially medical, are hard to interpret, but even in a series so small as Dr. Alvarez has given, call for serious consideration.

There are doubtless many good reasons for doing tonsillectomies, but just what will happen to the system as a whole after this operation is done, or what would happen if it were not done, is what we must know more about if we are to give an intelligent prognosis in this class of cases.

Just as individuals vary in size, appearance, and so forth, it is reasonable to suppose that they vary in the matter of resistance to infection. One patient has an acute appendix and dies. Another has practically the same condition, and makes a good recovery. So, through the whole list of diseases, one patient reacts favorably and another does not. Why is this? Allowing for difference in virulence of bacteria, age and size of patient, we still have the major factor of resistance to infection or immunity which is of much importance when giving a prognosis, and especially in the matter of focal infection. If we understood and had some way of measuring from time to time the resistance of an individual to a particular focus of infection, we could then make a graph showing whether he was approaching the danger-line or receding from it, and determine whether a tonsil, even though it contains cryptic material, must be removed to prevent the patient crossing the danger-line and developing serious conditions. On that same basis, if the tonsillectomy was done and we had removed the correct focus, the infection curve should subside. Whether this resistance should be measured in terms of blood chemistry (blood urea or sugar tolerance), by lymphocyte counts, or in some other way, we do not know, but it seems of sufficient importance to warrant the most exhaustive studies and experimentation.

A questionnaire recently sent out to a number of laryngologists and internists on this subject brought the following results: Question: Is the resistance of the patient an important factor in estimating the progress of a focus in the tonsils? Answer: Yes, 25; no, 3. Question: Do you know any method of measuring individual resistance? Answer: No, 24; by ancestry, 1; by habitus, diet, hygiene, exposure, infection, habits, etc., 1; clinical judgment, 1.

The fact that twenty-five out of twenty-eight were very emphatic in their belief that resistance is an important factor, and that twenty-four of the same men had no way of measuring that resistance, is most interesting.

If future studies along this line result in some accurate methods of infection curve and resistance estimation, we may, at least, be

spared the criticism of ill-advised tonsillectomies. Also, we may be able to persuade many patients, certainly headed toward systemic infection in later life, to permit thorough search and adequate attention to foci while there is yet time.

Treatment: Generally speaking, we do not believe that medical treatment of a chronic diseased tonsil is of any use whatsoever. So-called circumcision of the tonsil is of even less value. Radical enucleation by complete tonsillectomy is the accepted treatment today, but the methods used vary considerably.

Anesthesia (general): First, in regard to anesthesia and position, we believe ether should always be given to children and favor using ethyl chlorid or gas oxygen in the first stage to induce rapid unconsciousness. From an experience of over four thousand tonsillectomies we believe that the Rose position is the one best adapted for operation with a general anesthetic. The value of the Rose position to one who is accustomed to it cannot be overestimated. With the head lower than the body the blood, pieces of adenoids, vomitus, or any foreign material is removed by gravity and we do not have to depend upon any suction apparatus to keep the throat clear. It is a very easy matter, when the patient lies flat on the table, for some foreign material to be carried into the lungs by insufflation and form an abscess, no matter how careful the operator or his assistants may be, and we firmly believe that a position favored by gravity is the safest and the best preventive of this difficulty, as well as the easiest in the matter of keeping the operative field clear.

Local. In using a local anesthetic it does not make much difference whether one uses .1 per cent cocain, as is done at the Mayo Clinic, aposthesin, or novocain, if one uses ordinary judgment. The main point we wish to mention in regard to the local anesthetic is that some operators paint the throat with a strong cocain solution previous to the injection. This practice we dislike very much because while a sensitive throat oftentimes is a great hindrance to doing tonsillectomy rapidly, a complete loss of sensation in the pharynx is a great detriment to the patient and it is these patients, we believe, where sensation in the pharynx has been removed by cocain, that have suffered the occasional misfortune of having a lung abscess, due to the fact that materials have gone down the trachea unrecognized by the patient.

Another point which we wish to mention is in regard to secondary tonsil tissue, located at the base of the faucial tonsil. Many operators do not bother with this, partly, as they argue, because a considerable hemorrhage results in its removal, and partly because it is

not a source of infection. We are very positive from our experience that this tonsil is capable of holding infected material and is as real a source of infection for its size as the larger tonsils, and so it is our practice to remove this tonsil tissue completely to the base of the tongue.

So, we are lead to the following conclusions:

1. In the matter of diagnosis, the important points are: a, the history of the case; b, the character of the cervical glands; c, the evidence found by direct examination; d, the condition of the pillars; e, a history of diseases caused by focal infection.

2. In regard to prognosis. With our present knowledge we have no alternative other than advising removal if infection is found, simply hoping that the symptoms of a focal infection will be improved. We have no way of being certain that focal infection diseases, supposed to be caused by infected tonsils, will be prevented or that definite diseases of this character which the patient now has will be cured, other than the fact that general statistics support the point. Whether a particular individual will be benefitted we cannot say and until studies have been made determining selective foci and individual resistance, and this resistance balanced against his known infection, we will not be able to speak authoritatively to him on this point.

3. In regard to treatment. We believe the anesthestist a major factor in tonsil operations. We think the Rose position, favoring gravity, to be the proper position for a general anesthetic in tonsil operations, since it is almost impossible while in this position, for the patient to insufflate blood clots, adenoid material, stomach contents or what not. Also, in doing a tonsillectomy in an adult under a local anesthetic, we advise against painting the throat previously with a cocain solution, since we believe if sensation is lost in the pharynx it is much easier for materials to drop unnoticed into the trachea and thereby be a factor in the production of a lung abscess.

Johnston-Wickett Clinic.

ENDOSCOPY OF THE ESOPHAGUS FOR DIAGNOSIS AND TREATMENT OF STRICTURE, CARDIOSPASM AND MALIGNANT DISEASE.*

DR. HENRY HALL FORBES, New York.

The Chairman assigned me to the diagnosis and treatment of stricture, cardiospasm and malignant disease of the esophagus by endoscopy and very kindly requested that I limit my paper to ten minutes; this I am willing to do and I will try to speak only of the most interesting phases of these conditions as they appeal to me.

Esophagoscopy was one of the later developments of our means of investigating the interior of the body by hollow tubes combined with electrical illumination. Only a few years ago when I requested the Medical Department of the hospital to refer esophageal cases to the Bronchoscopy Department for examination, I was met with the reply that the operation was too dangerous. My impression is that I was faced with a 23 or 24 per cent mortality. This will serve to illustrate our progress in the use of these instruments and I am quite sure the writers of the evening's papers have now no apprehension in performing an esophagoscopy for diagnosis or treatment.

In the diagnosis of these esophageal conditions we find dysphagia the one common symptom, the patients presenting themselves with either an acute complete blocking of the esophagus, as seen in a case of angioneurotic edema or the slow gradual onset of this symptom as it occurs when the esophagus is attacked by malignant disease. The endoscopist at this point becomes the specialist for the diagnosis and relief of the dysphagia, for it is to him that the internist and surgeon now turn for assistance.

As a general proposition in all cases of difficulty in swallowing, a study of the act of deglutition should be made by the fluoroscope. This consists of an attempt by the patient to swallow a barium or other opaque mixture. At the same time a radiograph of the chest is taken to determine any evidence of external pressure which might cause a pressure stenosis. A most interesting picture is seen by the fluoroscopist in a marked case of stricture of the esophagus, which has existed for some time, a sausage-like dilitation will be found filled with the barium mixture and below this point a thin line will

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be noted as the barium mixture slowly passes through the strictured area; this is known technically as a canulization.

A complete physical examination of the patient and a blood test are routine preliminaries. An indirect examination of the pharynx and larynx is made to eliminate any disease in this location. Jackson's sign of high esophageal stenosis is of value and consists in the pyriform sinus being found filled with a frothy secretion. It is in these cases of high obstruction that secretions may enter the larynx. This has occurred in an examination by the bismuth mixture, the radiograph later showing the mixture in the bronchi.

Congenital strictures, webs and imperforate esophagus in the new born occur and the bronchoscopist is an aid in both diagnosis and treatment. Gastrostomy is indicated in the cases of imperforate esophagus, while in congenital stenosis careful bouginage is successful and the risk is slight if any, as regards to mortality.

Stricture or compression stenosis of the esophagus by pressure from without occurs. Aneurysm, dilated heart and thoracic new growths have occurred the most frequently in my experience. The presence of an aneurysm is a distinct counterindication to esophagoscopy except in case of foreign body.

The diagnosis of the stricture following the accidental swallowing of one of the caustic soda washing powders is easily made. We have the history of the accident, the presence of burns of the mouth and pharynx and a difficulty or total inability to swallow even liquids. This type of case has been of interest to the bronchoscopist and at the present "The Lye Committee of the A.M. A." is making efforts to pass legislation in all states preventing the sale of these preparations unless sold under the "poison" label and the antidote printed. I have found the most frequent site of a cicatricial stenosis in these cases to be in the region of crossing of the left bronchus. The dilating of these strictures under the guidance of the eye is most satisfactory by the use of bougies. Do not be in a hurry; rapid divulsion is not necessary and the risk is too great.

The symptoms in cases of slowly developing stenosis are practically the same, dysphagia may be noted as the first to occur, later as the stricture contracts and food is retained for some time we have a regurgitation of the ingested food mixed with secretions. Loss of weight is marked in cases of nearly complete stenosis. This loss of weight you can readily see will be determined by the amount of food which can pass the stricture. Occasionally patients will present themselves with an acute obstruction, and a history of a gradu-

ally developing difficulty in swallowing—this may be due to the lodgement of some solid particle of food which gives us the symptoms of an acute stricture; for example, the recent case of a child in which the acute symptoms were relieved when the child vomited a large huckleberry, but in which later a stricture was found due to the swallowing of a lye preparation some months before. With the above history and after the fluoroscopic examination, the esophagoscope may be passed—this I consider to be a hospital operation. In making a differential diagnosis with the esophagoscope our previous experience will be of value and it is well to keep in mind certain points. The spasmodic contraction of the cricopharyngeal muscle must not be mistaken for a stricture; this may puzzle the beginner and the use of a general anesthetic may be necessary to clear up the diagnosis between a cicatricial and spasmodic stenosis. The narrowing due to a pathological lesion is recognized by the eye, but it may be necessary to use suction or even lavage to wash away food remnants before the actual local conditions can be recognized. The cicatricial area, which may be annular or eccentric, is seen usually pale as compared to the normal mucous membrane. Stagnation of food may cause dilitation, esophageal inflammation and even ulceration.

The treatment of the acute cases must be one of caution. Blind bouginage is of course to be avoided as it is not only a dangerous procedure but violates all the principles which the bronchoscopist is trying to teach. The expectant plan is best; we allow the healing of the ulcerated area in the acute cases, the use of specially prepared foods is in order, and bismuth subnitrate as a dry powder is given, this has a local antiseptic action on the mucous membrane. Later a gradual dilitation of the strictures under the guidance of the esophagoscope is in order. If the obstruction is so marked that no fluids will pass, a gastrostomy is in order; this is an additional aid in our treatment as it puts the esophagus in a physiological rest, supplies water and food and hastens the healing of the ulcers. Care in diet, careful watching of weight loss and the assistance of the pediatrist will be a help in our feeding problems in children; a gastrostomy may thus be avoided. These principles of treatment are to be followed in all cicatricial stenoses. The technique may have to be varied to suit special cases or indications.

Dr. Jackson advises me that he feels retrogate bouginage, with the Tucker bougie, is the most rapid way of accomplishing results in all cases not suitable for esophagoscopic bouginage; that is, in all cases where the strictures are multiple and eccentric.

Electrically heated bougies have been used by Dr. Imperatori and others with good results. Impermeable strictures in the cervical region can be relieved by external operation.

Accidents are bound to occur and a rupture of the thoracic esophagus is an unfortunate experience in our attempts to dilate a stricture or when diagnosing and treating malignant disease. This is not necessarily a fatal accident. I have reported one case of rupture of the esophagus occurring in a child; the patient recovered without operation. Immediate gastrostomy may be performed in a case of ruptured esophagus and thoractomy, should the pleural cavity be involved. Rupture of the cervical esophagus is not so serious in its complications.

Cardiospasm is the term still used in the textbooks for the condition which endoscopists, through the studies of Jackson and Mosher, believe to be due to the closure of the esophagus at the level of the diaphragm by a spasmodic contraction of the muscles which surround the esophagus as it passes through the diaphragm. It is termed by one author, a diaphragmatic pinchcock stenosis, a phrenospasm. The effect of the spasm is to cause either a partial or complete obstruction to the passage of food into the stomach and to give rise to the following symptoms which help us in our diagnosis. The most constant symptom here as in the organic stricture is dysphagea, varying in degree. If the spasm is frequent in its periods of complete closure, there is distress, and a feeling of distention as the food accumulates above the diaphragm. This may be relieved by a regurgitation of the accumulated food. It may be noted in cardiospasm that fluids give just as much trouble as solids, differing from the malignant or benign stricture. The patient feels the relaxing of the spasm and will tell you the food is now passing into the stomach. Loss of weight due to the nutritional disturbances will be found early in the severe cases. Hiccough may occur as a symptom, and dyspnea after eating, due to pressure of the dilated esophagus may be present.

The diagnosis of cardiospasm is made by the long duration of the conditions, the difficulty in swallowing both liquid and solid food, the X-ray findings, *i. e.*, the obstruction to the barium mixture occurring at the level of the diaphragm and finally the results of the examination by the esophagoscope; large instrument will pass into the stomach. The presence of an ulceration, a new growth or an organic stricture is easily recognized.

The treatment of these cases is most satisfactory, in many cases, the passage of an esophagoscope will cure our patient. A certain number may require forcible dilitation; others may be relieved by the

use of antispasmodic drugs. Forcible dilitation has been followed by fatal results. If necessary a stomach or duodenal tube may be used as a means of keeping up the nutrition. Gastrostomy is rarely required.

The diagnosis in the average case of carcinoma of the esophagus is not difficult. Unfortunately many do not come for treatment until a cachexia plus a history of gradually increasing difficulty in swallowing and loss of weight are present. Pain is a later symptom. Here again a full history with a complete physical examination as well as blood tests should be made. This is followed by a fluoroscopic examination of the esophagus, using the barium salts as well as an X-ray plate. With this data before us an examination of the esophagus is made in the operating room, usually under local anesthesia, using my esophageal speculum for the upper portion of the tube and the 7 m.m. or 10 m.m. esophagoscope to continue the examination downward. The lesions found vary; early there is a simple infiltration, later ulceration is present. The cancerous ulcer has raised edges and granulative tissue—this bleeds freely on any manipulation. Simple, luetic and tubercular ulceration must be kept in mind. A combination of a luetic and malignant lesion may be present. Biopsy renders the diagnosis certain and a specimen when the lesion presents fungations or polypoid masses, and may be taken, especially if radium is used at the same sitting.

Treatment: Early gastrostomy to give the esophagus physiological rest and to keep up the nutrition is to my mind the first indication for treatment when a diagnosis has been made. Hunger and thirst are relieved and life prolonged; no patient should be permitted to starve to death.

Radium or combined radium and deep Roentgen therapy, I believe to be still in the experimental stage. The earlier we see our cases the better will be the results of our treatment. My earlier study embodied in a paper in 1920 led me to feel very pessimistic in the use of radium. However, recent results and the reports of other observers should encourage us in our efforts to help these otherwise hopeless cases.

Transthoracic operative efforts are still advocated by the surgeon in early cases and when the nutrition has not suffered to a great extent.

40 East 41st Street.

NASAL INFECTIONS.

Dr. F. W. Briggs, Duluth, Minn.

Any study of infective processes within the body implies a knowledge of the lymphatics and their mode of activity. The lymphatics have to do with prevention of infection, yet when infection has once become established the lymphatics act as disseminators of germs and their toxins. The lymphatic system derives its name from the fluid it contains: lymph, meaning water. The constituents of lymph are about those of the blood. Each being less in amount except water, which is much more. The blood capillaries absorb materials soluble in water, while the lymphatics are capable of absorbing solids and materials insoluble in water. The lymphatics include not only the lymph vessels and the glands through which they pass, but also the lacteals or the chyliferous vessels of the small intestines, which differ in no respect from the lymphatics elsewhere, except they contain a milk white fluid, the chyle, during the process of digestion. The material thus absorbed from the upper parts and organs of the body, after passing through the lymph glands, is collected into the lymphatic vessels, to terminate in the subclavian vein just before it enters the heart. The lymph nodes or glands are small oval-shaped bodies, situated in the course of the lacteal and lymphatic vessels, so that the contents pass through them on its way to the blood. The lymph node has a hilum where the blood vessels leave and enter, is composed of a medullary and cortical portion and is encapsulated. The efferent vessels are derived from the medullary portions, while the afferent vessels empty themselves into the cortical substances. In general outline, they strikingly resemble the kidney. Included with these structures are also the appendix, Peyer's patches, solitary lymph nodes, tonsils and adenoids which are situated subepithelially, but have function identical with the lymph glands, more nearly along the blood vessels. The function of the lymphatics, aside from being the conveyors of the products of digestion into the blood, is protection from the invasion of pathologic and disease producing organisms. The exact manner by which this is accomplished can best be studied and its importance realized by a study of the lymphatics when once they become deranged, for thus they become the conveyors or disseminators of infection. The lymphatics of the upper extremity, including those of the nasal fossa,

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were first studied and described in 1859 by E. Simons, while the lymphatics of the nasal sinuses have been further investigated by Sir Frederick Treves, Delmere, Poirer and DeCosta. From these studies we may conclude that the lymphatics of the nasal sinuses drain into the pharyngeal lymph nodes, which receive their tributaries from the nasal fossa. They in turn send vessels to the internal jugular group of cervical nodes, which communicate freely with each other and with the external group, to terminate in the jugular trunk, which on the right side helps to form the lymphatic duct, or enter directly into the internal and subclavian veins, and on the left side empties directly into the venous junction of the thoracic duct.

The upper or olfactory portion of the nasal fossae which communicates with the meninges, has a system of lymphatics more or less independent of the lower respiratory portion, but both systems run backward to the posterior wall of the nasal fossae where there is a veritable rendezvous of the lymphatics. Here they communicate with some coming from the Eustachian tube, and empty into the retropharyngeal nodes, which drain into the internal jugular chain underneath the posterior belly of the diagastic muscle. The nose is well supplied with lymphatics. In general their development is scant and slender, where the mucosa is thin and stretched, as in the septum, superior turbinate, and ethmoid regions. But where the mucosa reaches its maximum thickness, as in the floor of the nose and in the turbinates, the richness is indeed marked. In conclusion it is safe to assume that the lymphatics of the nasal fossa together with those of the nasopharynx are made up of a single net, whose parts are more or less directly connected with each other, and become an integral part of the lymphatics of the body.

In order that focalization of pathologic germs may occur within the body, there must be, at least, a temporary breakdown in the lymphatics, at the point of this focalization, else a nidus of infection could not be. It is important that this fact be borne in mind, in any study of the incidence of infection, whether it occur in an abrasion, of the outer covering, of the body, along the alimentary canal or in the upper respiratory tract.

The nose is an air handling organ, a part of the respiratory system, wherein the air is moistened, warmed, and cleansed, the mucus membranes of which are capable of killing or rendering harmless any and all pathologic germs, provided they come in contact with it, in not too great numbers at a time.

Nasal infections occurring in the infant, usually have their origin in the chronic rhinitis of the nurse or mother, either by direct con-

tact, as in kissing, or through the act of sneezing or coughing. The ease with which these noses become infected is due to rudimentary and undeveloped nasal anatomy, lodged there by the act of vomittrils of mucus or coagulated milk, lodged there by the act of vomiting, making normal nasal respiration impossible. Once infection has obtained, there is produced a vicious circle, the more often or virulent the infection, the less the nose is used, the greater the congestion, the less the development. Thus within the nasal fossa, we have at least a temporary breakdown in the lymphatic tissues.

With often repeated or continuous infection within these organs the glands along the lymph streams leading from these infected areas must of necessity break down as is so commonly seen in Waldeyer's ring. When these glands no longer function they become an added load and contribute enormous quantities of pus and debris to the already infected lymph stream on its way to the heart. Once these products reaches the heart the germ fighting elements and organs of the blood and respiratory system are called upon, over long periods of time, to deal with enormous quantities of germs, which function may not be accomplished, leaving the germs to float about in the blood, there to metastesise wherever is found tissue of low vitality. Thus the appendix, gall bladder, pancreas, heart and lungs may succumb and become the seat of metastatic infection, which because of its pain or other serious manifestation calls for immediate attention, and for the time being, overshadows the condition in the upper respiratory tract as of etiologic importance. For by the time metasteses have arisen the nasal condition has drifted into chronicity, giving the patient little distress or discomfort. However, occasional exacerbations that are called colds, indicate infection; yet because of the slight discomfort they occasion (as a rule) their significance is little appreciated and pass unnoticed. Nasal discharge, however slight, is pathologic with very few exceptions, and indicates lymphatic breakdown or a nides of infection. The nose as an air handling organ must come into intimate and close contact with the air in order to warm, moisten, and cleanse it. How then can the nose function, if it is blocked or bathed with mucus, or is not used as in mouth breathing? Nasal discharge is not normal, as is seen by the discomfort it occasions. Some is forcibly blown from the nose or is drawn back into the pharynx in order to re-establish nasal respiration. Some seeps into one or more of the paranasal sinuses, but by far the largest amount is absorbed by the lymphatics. The fibrous tissue resulting from inflammatory processes within the lymphatics offers no resistance to pathologic germs.

and their toxins, consequently tonsils early cease to become sore following acute infections within the nose, but are small and shrunken, giving little, if any, discomfort. If tonsils are removed before this process of shrinking takes place there is produced artificially a condition analogous to that which would ensue were they left to nature's processes, but in a shorter time. In either event, nasal infections have neither been cured or prevented. Indiscretions in dress or exposures to drafts are but the occasion of the lighting up of infections within the nose, and not their cause. The common cold or nasal infection, depends upon germ life for its inception, and in this respect does not differ from any infective process. Because of the rudimentary and undeveloped condition of the nose, mucus surfaces are incontact, at which points germs lodge. These areas of contact may be large or small, constant or occasional, but are the primary focus of infections and supersede all others.

Until this condition is recognized and rectified we can rightly expect metasteses to appear and reappear wherever blood circulates. Nasal infections date usually from infancy. Full many is the child who during a third or more of his development years does not use his nose either because of nasal obstruction, infective processes, habit, or a combination of these reasons. Yet air properly prepared for the lungs can be accomplished only by passing through a normal nose, and a normal nose cannot be developed unless it is used eighteen times a minute, sixty minutes an hour, and twenty-four hours each day. Any gross departure from this physiologic process invites infection with a commensurate lack of development, and the establishment of that so-called vicious circle. The less the nose is used the less its function and the less its development. Animals that spend their lives in the open air do not have nasal infections and are subject to very few diseases. Those who have studied these animals are astonished at the wonderful development attained in all the organs and tissues, and the almost entire lack of infective processes. Tumors are not encountered and cancer is unknown. The employment of the X-ray and transillumination is of little value in determining mal or dis function of the nose and is unable to demonstrate the points at which mucus surfaces impinge within the nostrils. True they sometimes tell us of metasteses within the sinuses, but these are late processes and their treatment or surgery, though sometimes necessary, have no permanent effect upon the primary cause of these metasteses.

Nasal drainage is not the object to be sought in our teachings or our surgery. It is nasal ventilation and areation. A functioning

nose does not drain, nor a draining nose function. The removal of turbinates cannot but destroy function, and the ablation of paranasal sinuses is entirely uncalled for in nasal surgery, in but strikingly few cases. The surgeon's first duty lies in the restoration of function, and the conservation of nasal tissues. In noses with impaired function, it is always possible to demonstrate with the pharyngoscope one or more points where mucus surfaces are in contact. Herein lies the greatest factor of the inception of infective processes within the body.

With the passage of time, insidiously, silently passing out to the heart from these areas, is a more or less constant stream of pathologic organisms, and the toxins that they have elaborated. Our attention in later life is often called to infection throughout the body, which seems to be entirely independent of this primary focus. Yet it is a well known fact that infections tend to become silent and painless, hence the difficulty of tracing cause to effect.

For years we have accepted nasal discharge as a more or less normal condition of the nose. Yet in order that the nose may function, it must not be blocked or its membranes bathed in mucopus. In order that the air be cleansed and moistened, the incoming stream of air must come into intimate and close contact with the membranes of the nostrils. The incidence therefore of nasal discharge regardless of the germ life it contains, is indicative of nasal infection in the vast majority of cases and betokens a more or less functionless organ. These noses are rudimentary, undeveloped, and early show gross evidence of lymphatic breakdown.

Infected tonsils and adenoids sometimes become so large and diseased, they must be removed, because of their mechanical interference with respiration, or because of the large amount of pathologic tissue they represent, but their removal can in no way restore normal function to a crippled and deformed nose, made so largely because of lack of use and early infections.

To the laboratory technician we owe much for our ever-increasing knowledge of infections. With the microscope and X-ray he has set down in no unmistakable language, the result we may expect, and which are usually found in the vital organs of the body once infection has taken place. But valuable as these contributions have been, they do not provide us with means to prevent infections, or draw our attention to the nose as the common source of trouble.

Repeated nasal infections or chronic rhinitis is fraught with far greater menace to health and life than is appreciated. If disease conditions throughout the body are the results of pathologic germ

activity, it is certainly not a debatable question where these germs came from, if at the entrance into the body there is brokendown lymphatic tissue, even though by its chronicity it has become silent and largely painless. Repeated infections are no more normal in the nose than similar conditions elsewhere in the body and are no less dangerous here than elsewhere. With the pharyngoscope these areas can be demonstrated. Impingements and coapted surfaces are always to be found between the turbinates and the septum, or the turbinates themselves, or the turbinates with the lateral wall. Often these structures are packed so tight together that when the softer tissues are shrunken, no separation can be seen.

Nasal surgery, therefore, which has for its object drainage of the parnasal sinuses, gives but fleeting and exceedingly temporary benefit. Likewise the removal of the turbinates of the nasal chambers cannot result in any permanent good, for by their removal nasal function is entirely lost. So that where partial function may have previously existed, even that does not remain. The surgeon's first duty lies not along these lines, except as emergency measures, but his duty is to conserve and to restore nasal function. To the end that air may occupy the paranasal sinuses, and circulate freely and unimpeded, over and about the turbinates of the nose.

So far as our present knowledge goes, this can best be accomplished by a complete submucus resection of the nasal septum, whether it is deviated or not, thus securing ventilation and aeration, at the expense of no functioning tissue or organs. The nose is hereby relieved of a large amount of bone and cartilage, which occupies space much needed for air. With the free circulation of which there is often a fair return to normal function. Turgescence of the nasal membranes will be appreciably reduced, and thereby lessening to a marked extent, the incidence of infective processes within the upper respiratory tract, which are so frequently a traceable etiologic factor of bodily infections. The flow of the lymph is ever toward the heart, under normal as well as abnormal conditions. Its consistency is ever regulated by the pathology through which it flows, and the areas which it serves.

816 Fidelity Building.

CAPILLARY SUCTION AS AN AID IN THE TREATMENT OF EAR, NOSE AND THROAT DISEASES.

Dr. Joseph C. Beck, Dr. Harry L. Pollock,
Dr. Francis L. Lederer, Chicago.

The application of suction in the treatment of diseases about the head and neck has long been carried out but to employ it as a definite therapeutic measure has not been often emphasized. The suction, as employed in our clinic, has been the capillary type and various mechanical devices and forms of capillary tubes are made, depending upon the area to be treated. Medication has been greatly facilitated by the removal of pus and necrotic debris, especially in cavities as are found about the nose, throat, ear, and accessory sinuses, which are ordinarily not easily reached. Modifications of the various types of sinus probes and sounds have been devised so as to facilitate the cleansing of various sinuses.

Excellent results have been obtained by its use in chronic suppurating ears in combination with the dry treatment employed by us. It seems that aside from being a very good cleansing agent, it prevents the usual trauma which is naturally brought about by constant manipulation by swabbing, etc. Furthermore, dry treatment such as this, which avoids trauma and breaking down the defensive mechanism which occurs when fluids (hyper or hypotonic) by means of irrigation are introduced, should be thought of as the treatment par excellence. Then, again, we must appreciate that to introduce fluids to clear away secretions, as is so often advised in the form of douches, one risks the chance of extension of the infection to other sinuses or neighboring parts, whereas suction may be applied under inspection and directly to the part.

The uses which may be found for capillary suction are too numerable to mention and every day one may find an entirely new indication. It has been found to be of excellent benefit in operative work, especially in the smaller and less accessible operative terrains, and avoids the truma, delay and energy which is usually expended in constant sponging, wiping and swabbing.

The type of suction and the instruments for its use have been the cause of much thought and experimentation in our clinic for a num-

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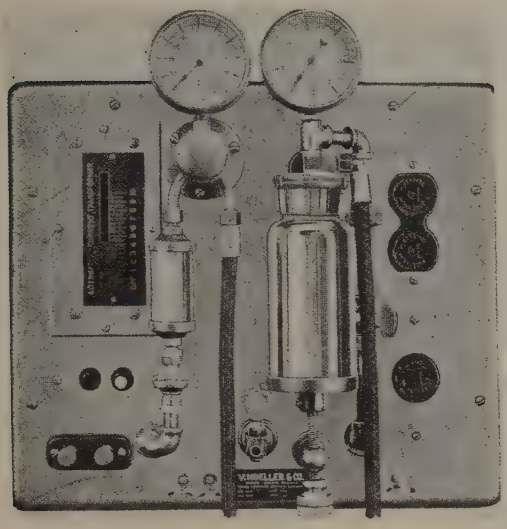

Fig. 1.

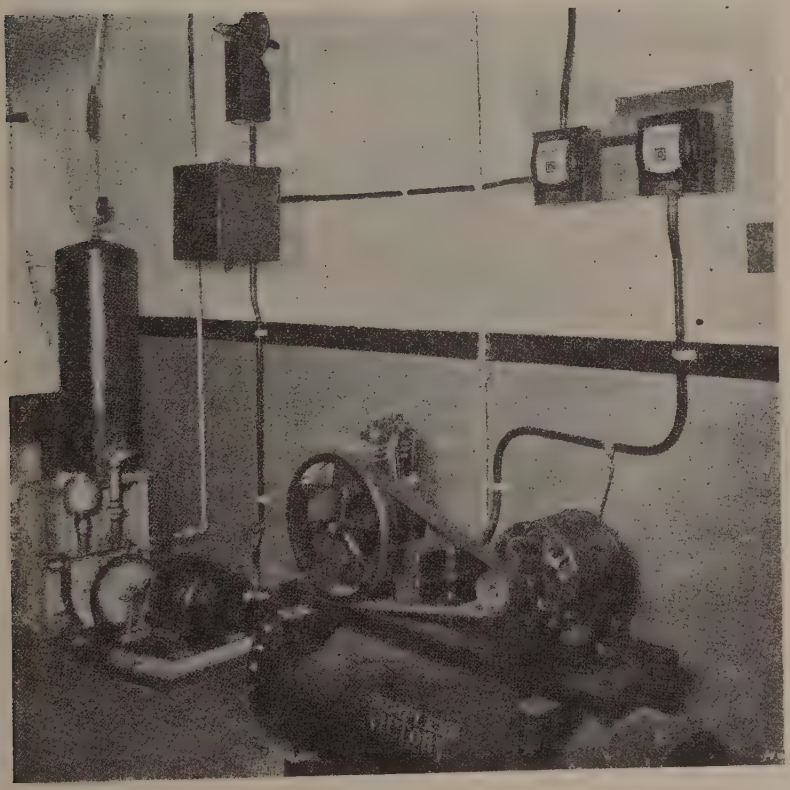

Fig. 2.

ber of years. As a result we have presented on numerous occasions the various instruments and devices which are herein reviewed.

We presented before the American Academy of Ophthalmology and Oto-laryngology, a wall plate that had been installed in our offices and has since that time been in constant use (Fig. 1). The wall plate consists of a suction and air pressure outfit, together with a transformer electric light and gas attachments. It is a compact unit and may be installed in any office. The negative and positive pressure pumps supplying our offices and operating rooms are placed in our basement, far enough away so as to not inconvenience our work by noise (Fig. 2).

We have been advocates, for a number of years, of capillary suction because of the decided advantage of this method over the mass or olive-tip suction. While olive-tip suction is still used by us in

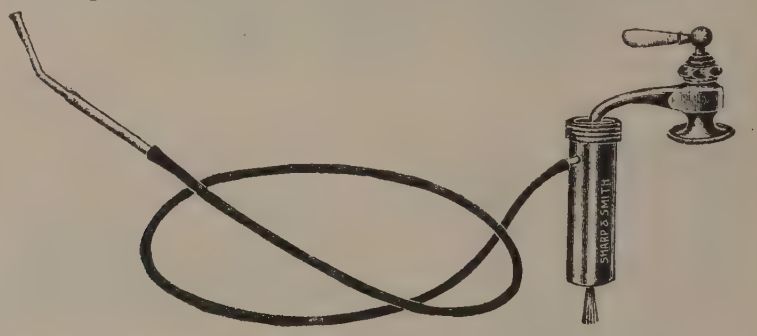

Fig. 3.

selected cases and in some children, we feel that this form of suction may prove injurious in several ways. The traumatism, which may be produced by this mode of employing negative pressure on the tympanic membrane by drawing it inwards, is definitely known. Also this extreme Bier's hyperemia, which this method may produce, is conducive to a serous exudation from the tissues and a drawing in of the mucosa, thereby causing a definite blockage of the meati. Briefly stated—and herein lies our explanation of what we mean by capillary—the capillary method is not a hit or miss affair, being placed directly under inspection, up to the area necessary to be cleansed without causing any feeling of discomfort or producing any congestion of the parts. This form of suction has in no wise proven less practical even in consideration of its home use. For this purpose we have employed a water suction unit consisting of a simple pump attached easily and directly to a water faucet (Fig. 3). Angular metal

suction tips, preferably protected by a rubber tip, may be used by the patient without the usual fear of placing self-medication of this kind into the hands of the patient after detailed instruction. A tip made of fibre silk for use in suppurative ears has proven of utmost value.

After much experimentation with various suction handles for office use, we have finally devised one, we believe, which supports those principles which have bothered us considerably in the use of suction in the past (Fig. 4). This handle is moulded so as to fit conveniently in the hand with the cut-off worked very easily by the thumb. The angle of 45° for the attachment of the various tips, makes a convenient angle for use in the nasal chambers and ears without the inter-

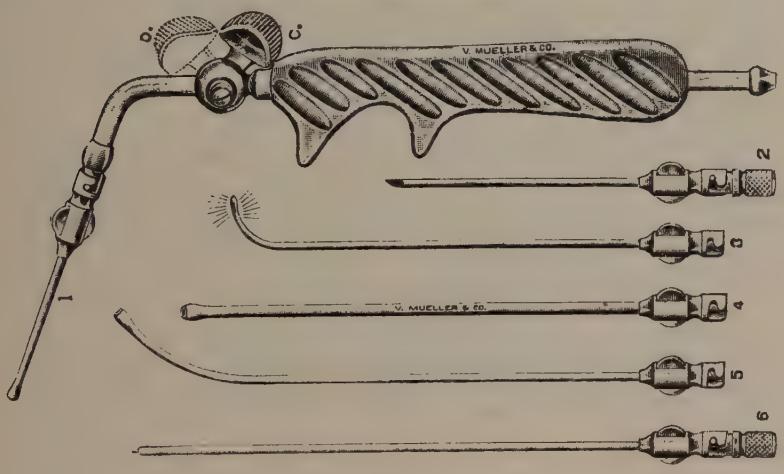

Fig. 4.

ference of the handle in the line of vision. The attachment for the various canulae is of bayonet variety in each of the six metal canulae. There are included in this set one short canula for the ear; a long, large lumen canula; one for the frontal sinus; one for the natural opening of the antrum; and antrum trochar; a long canula and trochar with a blunt end for the sphenoid. This handle and the tips are applicable for irrigation purposes as well as suction.

One cannot overestimate the value of suction over manipulation, particularly in acute diseases about the head. If statistics could be made so complete as to include what procedure was used during the acute infection before the complication set in, it might be definitely demonstrated that much in the way of the sequelae might have been avoided by the use of this carefully planned mechanical procedure.

A TECHNIC FOR SUBMUCUS RESECTION, WITH THE PRESENTATION OF A MEMBRANE ELEVATOR.*

DR. MARVIN F. JONES, New York.

Realizing that the presentation of another septal elevator is far from being a novelty, I still hope that others may try this instrument and find it as useful as I have.

The first model of this instrument was used in 1917. Since that time this elevator has been used by a number of physicians and their comments have encouraged me to present it.

In order to enumerate the uses of this instrument I wish to present a technic for the submucus resection of the nasal septum in which this instrument is used.

The field of operation being thoroughly anesthetized, the patient is placed on the operating table in a semi-prone position. Sterile towels are placed over the table and one moistened in bichlorid of mercury is wrapped firmly around the head of the patient. The nose is prepared with 3½ per cent Tr. iodin and alcohol, this preparation extending inside the anterior nares. The small hairs are cut away so that the view of the internal nose is unobstructed. Four or five thicknesses of gauze are then prepared to cover the patient's face and an opening two inches square is made for the nose. A sterile sheet covers the patient. The instrument tray is "set up" from right to left with the following instruments in order: 1, Freligh modification of Myles nasal speculum; 2, Freer's submucus knife; 3, Jones membrane elevator; 4, Killian elevator; 5, Douglass "hair pin" retractors; 6, Knight's nasal scissors; 7, Ballinger's swivel knife; 8, Demarest nasal forceps; 9, Lutz forceps; 10, nasal dressing forceps.

The nasal speculum is first adjusted so the blades are at right angles to the septum; they are separated as far as possible and then fastened in position. With the knife an incision is made starting one-fourth inch posterior to the mucodermal junction and close to the roof of the nose. This is run parallel to the bridge of the nose through the mucodermal junction into the skin. The next portion of the incision is at right angles to this and is made in the skin parallel to the mucodermal junction. It is then extended to the floor of the nose but not on the floor.

*Presented at the Nose and Throat Clinic of the New York Post-Graduate Medical School and Hospital. Service of Dr. Chas. J. Imperatori.

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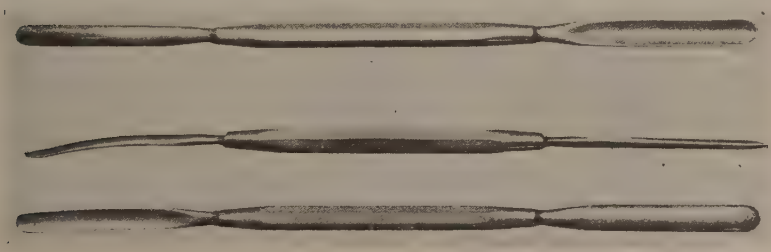
This incision has the advantage of giving the maximum amount of operation space; leaves a border on the membrane which is not easily torn, heals rapidly without sutures; and does not extend into the area from which bleeding is apt to occur.

The elevation is started at the superior angle by pushing back the mucous membrane and perichondrum. This is a very essential part of the operation. If the cartilage does not show pearly white without a pink shade the perichondrum has not been elevated. The elevation started at the superior angle is then increased until the perichondrum has been separated along the line of incision. The instrument presented in this paper is then inserted parallel to the cartilage and with a progressing "see-saw" movement is forced back parallel to the bridge of the nose until bone is felt. The handle of the instrument is then depressed, which forces the blade to the roof of the nose. It is then withdrawn along the roof. The instrument



is reinserted and with a stroking motion the membrane is elevated to the floor.

The blade of this instrument is fashioned so that the beveled tip combined with a curve makes the elevating surface hug the cartilage, producing elevation in a safe and rapid manner. The dull, rounded tip makes it nearly impossible to force the instrument through the cartilage. It is also difficult to perforate the membrane provided the elevator has been started under the perichondrum. The curve in the blade also retracts the membrane, giving a fair view of the elevation as it progresses.

The operation has now progressed to the point of elevating the second side. To accomplish this an incision is made in the cartilage posterior to the skin incision and parallel to it. This does not go through the cartilage but leaves a groove made by the knife. The tip of the nose is then bent to the opposite side, which fractures the cartilage at the groove and into this groove is inserted a curved, flat, blunt-ended Killian elevator. As the perichondrum on the opposite

side is intact, the elevator slips parallel to the cartilage and begins the elevation with little danger of perforation. The elevation is then continued with the elevator which is presented, using the same technic employed on the first side.

The "hair pin" retractors are then placed on both sides of the cartilage and under the membranes. A small nick is made in the cartilage with the scissors at the upper extremity of the incision. The swivel knife is placed in this nick, forced parallel to the bridge of the nose until it strikes bone. It is then disengaged, the handle lifted and the tip forced downward and backward to the floor. It is then withdrawn along the floor. The cartilage is removed with the scissors, a nick is made in the perpendicular plate of the ethmoid to the depth of one-half inch. Another cut with the scissors is made one inch below this. The object of these cuts is to prevent tension on the cribriform plate of the ethmoid when the bony partition is removed. The removal of the bony partition is accomplished by the use of the Demarest forceps. The superior maxillary spine is then removed with the Lutz forceps.

One of the most frequent and troublesome deformities to correct is the ridge. It is to elevate this portion that the second blade of this double-ended instrument was devised. There are two methods of procedure. One is to elevate below and above the ridge, which leaves the edge attached. The groove in the blade of this instrument fits over the ridge and the rounded end elevates this readily by the simple procedure of pushing it along the ridge from before backward. The other procedure is to remove all the cartilage and allow the ridge to remain. The ridge (if cartilaginous) is then lifted from its bed by using the elevator, concave side up, and at the same time it will separate itself from the attached membrane.

It is my hope that the use of this instrument will result in a more rapid, safe and easier performance of the rather difficult submucous resection of the nasal septum.

40 West 52d Street.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

October 16, 1924.

New Instruments:

A New Bronchoscopic Powder Insufflator. Dr. Louis H. Clerf.

A Bronchoscopic or Esophagoscopic Specimen Collector. Dr. Louis H. Clerf.

Bronchoscopic Specimen Collector. Dr. Robert M. Lukens.

Bronchoscopic Syringe. Dr. Robert M. Lukens.

Acute Mastoiditis Caused by Streptococci (Hemolyticus and Nonhemolyticus) Associated at Times With Pneumococci. Dr. Philip S. Stout.

Dr. Stout reported four interesting cases of acute mastoiditis. The streptococcus hemolyticus was isolated in three of these cases and the remaining one was a mixed infection of the streptococcus and pneumococcus. His experience has been rather unfortunate as three of these cases terminated fatally. The patient that survived, he operated within forty-eight hours after the onset of the otitis media.

His deductions are that when the blood flows freely after the eardrum is incised, it is invariably a streptococcus hemolyticus infection. In view of the fact that three of his cases terminated by fatality, he urges immediate operation and likens this condition to acute appendicitis.

DISCUSSION.

DR. M. S. ERSNER: In a paper just completed, we made exhaustive studies of the organisms found in acute mastoid disease. We found the streptococcus hemolyticus in 35 per cent of the total cases studied.

Our experiences have been most gratifying and at no time were we alarmed nor had we any cause to be when the streptococcus hemolyticus was found.

We went one step further by closing all the mastoid wounds with the blood clot dressing irrespective of the organisms found.

On Dr. George M. Cotes' service, at the Medico Chi Hospital, we average between 75 and 100 mastoids yearly.

A great deal of blood found after the eardrums are incised may be pathopneumonic of acute mastoiditis and suggestive of streptococcus hemolyticus infection, but, it is not always conclusive. One symptom should, therefore, not be taken as a criterion for mastoid operation.

I have observed that many acute otitis media will clear up without mastoid operation although the infecting organism is the streptococcus hemolyticus; we therefore do not operate immediately and we give the patient the benefit of the doubt. However, if operative procedure is decided upon, we taken into consideration the subjective, objective, local and general symptoms and correlate them with the X-ray and blood findings.

DR. JOSEPH POPPER: The prevention of mastoiditis is naturally more important than its treatment. I believe that many cases are prevented if myringotomy is not performed too early in the course of acute otitis media for the same reason that any surgical incision is best performed when the acute congestive stage is past. On the Pedriatic service of Lebanon Hospital in New York during the past three years myringotomy has been done very unfrequently although about 50 per cent of all admissions have ear infection or develop it. No mastoiditis requiring operation has been seen in any of our cases under continuous observation.

DR. GEORGE MACKENZIE: I do not agree entirely with Dr. Ersner concerning the blood clot dressing. I do, however, agree with him on other

important points. It is possible to have a frank mastoid empyema without pain, swelling of the mastoid, tenderness, fever, middle ear discharge, or other classical symptoms. These atypical cases are particularly dangerous and require careful study. In all cases where the symptoms are masked, we do not want to indulge too long in watchful waiting, but study the case carefully from every possible angle. Labyrinthine involvement, sinus thrombosis and the other intracranial complications in the early congested stage present the symptoms of irritation (hyper-irritability) prior to the development of the suppurative stage when the symptoms are more profound. In the study of every case our object is to uncover the milder symptoms of irritation sufficiently early to forewarn us of the possibility of the more grave consequences later, should we postpone operation until the latter condition has set in. We should also study our cases most carefully for other reasons. In the case of dyscrasias, attention to them will often bring better results than operation on the mastoid alone. I have in mind a case reported before this Society two years ago by Dr. Shemeley in which a boy with hereditary syphilis presented symptoms very suggestive of sinus thrombosis. Dr. Shemeley was on the verge of operating for sinus thrombosis when the syphilis was uncovered by a Wassermann test. Antisyphilitic remedies brought about a prompt cure of all the symptoms suggestive of sinus thrombosis and made unnecessary the operation on the sinus.

I do not agree with the gentleman from New York concerning the incision of the eardrum in cases of middle ear suppuration. It is one of the first principles of surgery that whenever there is pus in an enclosed cavity, the earlier it is opened and drained the better, and this especially applies in cases of drum cavity. In the presence of acute middle ear suppuration we should incise the drumhead *freely*, not only to permit the exit of pus and for the relief of pressure thereby, but also to allow the entrance of air into the cavity and reduce by better aeriation the virulency of the infecting organisms.

Dr. J. H. Mendel: I wish to call your attention to a very early sign in the recognition of acute mastoiditis. I observed it upon two successive cases last winter: one a boy of ten, the other a girl of thirteen—a slight almost imperceptible thickening (rather than a swelling) over the antrum of the affected side evidently due to a beginning periostitis. Both of these children had had a discharging ear for about ten days and were running a temperature of 99 to 100° every afternoon. X-rays were taken and my suspicions were confirmed. They were each operated the day following the reception of the X-ray report. The boy had extensive destruction of the cells and a large extradural abscess—the girl had a sinus exposure at least 3 c.m. in length. Both made an uninterrupted recovery.

I do not think this thickening over the antrum would have been present had the cortex itself been abnormally thick—then again was this sign the very beginning of the classical swelling behind the ear and how much more destruction would have occurred had we waited for the thickening to really become a noticeable swelling?

Neither child complained at any time of pain over the antrum or tip. The absence of pain should not be interpreted to mean that the patient does not have a mastoiditis. Pain whether absent or present is a most unreliable symptom and too much stress should not be laid upon it.

We may as well make up our minds that the only reliable method of diagnosis in these cases of mastoiditis is dependent upon the X-ray and its interpretation by a competent Roentgenologist who is especially skilled in the recognition of the pathological conditions of the mastoid.

I agree with Dr. Stout in being more radical than conservative in opening a drum—nor do I believe in postponing a mastoid operation once you are sure of your diagnosis.. I have seen some sad results from waiting too long.

A Comparative Study of the Hearing Tests. Dr. Douglas Macfarlan.

In approaching the subject of the hearing tests I think it is better to talk upon the practical or clinical side than to launch into a consideration of acoustics in general. We should know something of acoustics to understand our hearing tests; unfortunately the average aurist knows little. The subject has to be dug out quietly and laboriously; its knowledge is essential to the ultimate complete understanding of all the phases and many of the contradictory reactions that we find clinically. The book that has helped me most is Dayton C. Miller's science of Musical Sounds. It handles this difficult subject clearly and easily.

However, tonight I hope that without going too deeply into acoustics, there can still be illustrated some comparisons in the different methods in testing hearing.

Probably the earliest test for hearing is the voice test. As a practical test it is excellent, for it tells us to what degree a person hears conversation, and "hearing conversation" is the most important function of the organ of hearing. But as an exact test, as an exact, recordable measure of hearing, the voice test is sadly insufficient. Whether we use the whispered or spoken voice it is impossible to control its intensity. It is impossible to duplicate the same test-voice on subsequent testings. Thus we cannot surely say that this patient hears today 5 or 10 per cent better than he did yesterday. We can only notice the most exaggerated changes, such as we rarely see. Further, the spoken voice is a complex color picture of tones, made up of hundreds of frequencies between 300 and 3,000 double vibrations per second. Each of these tones has an amplitude of its own, thus each varies in intensity. For, intensity is expressed by multiplying the amplitude by the frequency and squaring the result.

In any spoken word there are actually hundreds of tones. The letter "a" alone has been analyzed into sixteen major tones of varying amplitudes. These tones come to the auditory attention en masse. If the patient is deaf to high or low tones he will of course miss many of these tones in the conversation. Yet he may hear sufficient to be able to synthesize words and to make meaning out of what is said. His response to the test will greatly depend upon ability to synthesize sounds and upon tone memories and images. It can be seen that the voice can only with much care be used to differentiate high and low tone deafness. For this purpose single words or vowels of known value can be used, but even then the findings are very gross. I have arrived at this conclusion only after having attempted to make something out of the voice test as either a good qualitative or quantitative measure. The test is so bound up by factors of error, particularly those of the mental or interpretative sphere, that as a test of the pure sensory phenomena of hearing it should not be depended upon. The voice test makes the best interpretation test, but this subject is outside the scope of this talk.

The next test worth considering is Politzer's test, with the little striking hammer that hits a short rod of the vibration frequency of 512. Degree of hearing is determined by distance heard, which method in itself is open to criticism. The test is that of a single tone struck out each time by an identical blow. It is a tone absolutely standard as to intensity, which is a great desideratum, and in which the test differs from the voice, Galton, fork and monochord tests. Singularly it tells us little. If we could depend upon quiet rooms and upon uniform acoustic situations as to walls, hangings, windows, doors, etc., we might make more of the test. Its bone conduction attachment is of no practical value, for AC hearing interferes. The original principle was to test AC over distances, for BC the attachment makes a fixed distance very near the E. A. M.

Another test is the Galton, the whistle for determining high-tone hearing by AC. Here again we have that recurring fault in audition tests, the lack of control of tone intensity. The pitch can be fixed but the amplitude cannot. It is worth mentioning that it is rare to find any two Galtons or Galton-Edelmanns with identical readings.

With ignorant patients and with children it is difficult to have the patient understand that you only want a report on the hearing of the whistle—not the puff.

Of course the instrument is of use only in testing AC.

As a gross test the Galton is of value, its use is rapid and convenient. The examiner should adopt one policy, either starting from audible tones and going to inaudible or visa versa. It matters little which method is selected; with the former, going from audible to inaudible, one is apt to have tone memory and a lower reading.

But in going from inaudible to audible the patient is delayed in response in not knowing exactly what he is expected to hear. There is always the possibility of hearing around the head when high tones are tested. And further it must be remembered that stopping the untested ear increases the hearing in the tested ear.

I will not take up the Koenig cylinders nor the use of the resonators as Sonnenschein suggests, for as yet they are in the laboratory stage. I do want to mention the monochord and would recommend it as a substitute for the Galton. One who has a monochord will soon discard the Galton. Invented by a Hollander, it has become quite popular in foreign clinics, but we hear very little about it here. Lewy, of St. Louis, first mentions it, this is the only notice I have seen of it in this country. He tells me that he is very partial to it and has discarded the whistle.

The instrument as you see it is simple, its principle of excitation is open to the old objection that amplitude cannot be controlled uniformly. For low tone production the wire is stroked with a violin bow; transverse vibrations are produced. For high tones the wire is frictioned longitudinally and longitudinal vibrations are produced. It must be mentioned here that the longitudinal and transverse vibrations are two totally different stimuli, whose only point of resemblance may be pitch. This consideration is most important in the AC and BC testing with forks. From a clinical point of view the transmission of transverse vibrations is excellent by air, very poor by bone conduction; and conversely, longitudinal vibrations are best transmitted by bone conduction and poorly by air conduction.

This instrument gives us a new insight into high tone hearing, for with it we can test both AC and BC. We can take a Weber in the high tones with it. We can see that many cases suspected as having limitation of high tone hearing actually have normal hearing at least to BC and often to both BC and AC. To one who uses the instrument routinely, there will surely come a conviction that there is error in believing that high tone deafness is a common finding in syphilis. I do not want to say that they are wrong who report so often syphilitic high tone deafness. They found poor high tone hearing to the Galton, but were testing AC, and presupposing that BC was likewise affected. This is not always the case.

With the use of the monochord for the Weber, it seems more easy to lateralize than with the forks. This is an important advantage in our unilateral testing of a bilateral system. Forks are usually of comparatively low frequency, with high physical vibration, by which I mean that the transverse vibrations are of such amplitude as to approach tactile perception. (Their longitudinal vibrations are very small and weak.) With low forks of much vibration there is apt to be a confusion between feeling and hearing. In any event, about the highest fork we can use would be the 4012, whereas with the monochord BC can be tested up to the limit of the instrument, 24,000.

In short the monochord can do what the forks do, but at a much higher level; both AC and BC can be tested and the Weber taken. Again, it is most unfortunate that there does not exist a standard, measurable method of exciting the instrument. I use the monochord routinely for testing the high tones to AC and BC; and use the forks for testing the lower and middle ringes. The low transverse monochord vibrations produced by the bow are not easily controlled as to intensity.

The Audiometers. These instruments for the most part are built upon the principle of using the vacuum tube, and the accomplishment sought

is the measurable control of both pitch and amplitude. Such instruments deliver a sound of known intensity which for record purposes is ideal. Like everything human, the audiometers are not perfection, but the idea is right. The greatest shortcoming is that no method of taking bone conduction has been developed with them. It should be said that the audiometers of different makes show different normal curves. This of course is grossly due to the differences in scale, particularly where empirical scales are used as in Guttman's and Bunch's instruments. But the fact remains that even after the translation has been made there is difference in the norm. This means but one thing, that readings with audiometers have to be interpreted just as readings with the forks, whistles or monochord, in the normal of the instrument.

Here are two audiometers, the small one generates a compound tone made up of frequencies between 300 and 3000 d. v. This is the region of greatest hearing acuity as well as the region of speech frequencies. This area is comparable to central vision, while above and below it the comparison is that of the peripheral vision. The instrument is equipped with an intensity control that is graded to read percentages of normal hearing.

The second audiometer gives eight single pitches between 64 and 8192. These are arranged in octaves of C and the tone in each of these pitches can be increased from an inaudible point to one quite loud. A series of charts I have here show that a very graphic picture may be had of the status of hearing in the middle and lower ranges. Only AC can be taken, thus the comparison which we get with the forks, AC and BC, is wanting. On most of these charts I have written the findings with the Galton whistle, with the monochord, and with a very dependable Koenig fork of a pitch 488. You will see by studying the charts individually to what extent the different tests confirm each other. It must be remembered that the test finding with each testing instrument must be valued in the terms of its own normal. What these audiograms show is deafness not uniformly distributed throughout the tonal scale. The more minute the testing the more we see the hearing curve assume peaks and dips. What once were believed to have been islands of deafness are now known to be merely regions or pitches where acuity is poor.

There is this to be said for audiometers—their principle of testing is right—that is, the testing of pitch hearing in the light of pitch amplitudes. The examination with these instruments is rapid and gives a graph that is of great value as a record that may be compared with subsequent records. It is unfortunate that BC cannot be taken.

Finally as to forks. They still should be our mainstay in hearing tests, but they must be used intelligently and carefully. Certain fundamentals must be constantly in mind and testing conditions must be made uniform. To be of real value the tuning fork hearing must be timed; a measured blow must be struck and the normal of the testing fork must be established. The examiner must seek to perform with an unvarying technique, particularly as to holding the fork at the ear or on the bone. Remember tactile sensation in low forks. Remember that with poor forks or careless blows overtones may be produced and heard when the fundamental cannot be heard. Avoid auditory fatigue. Remember the importance of extraneous noises, of the mental sphere—attention, alertness, intelligence, timidity, tone image—and the other effects of the mental and emotional spheres. No two forks are alike, even when of the same pitch, thus records are only of value in the light of the normal of the fork as stated. If your own hearing is not normal nor dependable you cannot use yourself as the normal. Findings with careless technique are often misleading and time is wasted. The tests are not time-consuming as has been often said by those who have not gone into this matter carefully. A lot can be gotten from the tests if we understand them.

Comparisons in findings may be epitomized as follows:

1. None of the instrumental tests give an accurate idea as to what may be the patient's ability to hear speech.

2. The monochord shows that BC is often excellent in syphilitics, and in what are supposed to be nerve deaf cases.

3. The voice test shows that attention, alertness, quick cerebration, and general intelligence play an enormous part in hearing.

4. The audiometers show that there is varying audition for different pitches. They map out a perimetry of hearing.

5. The forks when struck with a definite blow, give the most dependable comparison of the relation of AC to BC.

6. None of these tests should be abandoned but should be used to accumulate evidence toward a more accurate diagnosis.

DISCUSSION.

Dr. George Mackenzie: The paper we have just heard is very excellent and quite complete. I am pleased to say that the subject of functional hearing tests is becoming popular. If I may be permitted, I will repeat what I said last spring at the St. Louis meeting of the Triological Society concerning the value of audiometers. I do believe that they will eventually become instruments of precision in plotting the fields of hearing. On the other hand, they will not replace the tuning forks. At the present time we are able, with the tuning fork tests, to tell quite accurately the location of the lesion responsible for the loss of hearing. Furthermore, we are able with these tests to recognize mixed forms of deafness which we are unable to do with the audiometers. The recognition of these mixed forms of deafness is very important and upon the correct interpretation of the findings depends our method of treatment. For instance, in a case of mixed form of deafness in which the patient had middle ear catarrh in early life, the treatment of catarrh because of its long standing will avail nothing, whereas, the treatment of the causes of the more recent nerve deafness will accomplish much. On the other hand, if the patient had nerve deafness early in life and should later develop catarrhal deafness, attention to the later appearing (catarrhal deafness) will accomplish more than the treatment of the longer-lasting nerve deafness. Considerably more might be said concerning these mixed forms of deafness which I will not repeat now since I have so recently covered them in a paper on the subject which appeared in the *Eye, Ear, Nose and Throat Monthly.*

Dr. T. A. Babbitt: There are three fundamental situations. 1. Acute measurement of hearing before treatment. 2. Accurate measurement of hearing after treatment is started and its progress. 3. Priority of nerve or conduction deafness.

The last test is speech perception and that is what the patient wants. I have often wondered whether some of these ultra scientific tests, although beautiful, do not lose some of their value. The patient wants speech perception and that is what we must approach and improve.

Dr. Douglas Macfarlan: Dr. Mackenzie's remarks on the value of the forks for differential diagnosis cannot be too often reiterated. None of the instruments can take their place; but it is essential in using forks that they be timed. In timing forks, by which is meant, determining how long a fork is heard, there must be struck a standard blow. The variation in fork hearing time when the knee blow is used, should make us abandon this inexact method. Last year I gave you some figures proving this. The pleximeter I use gives very dependable blows of practically always the same intensity. For example, I have a Koenig fork of 448 d. v. which will invariably give 30 seconds BC, 60 seconds AC when struck after this method. For those unfamiliar with forks I would say that no two forks even when of the same pitch can be expected to show identical hearing time. Each fork has its individuality, due chiefly to its internal structure. Do not expect to find a fork that will give the classical time-picture of Alexander, 60 BC, 110 AC. For a number of reasons I prefer a shorter hearing time than this.

I would recommend to those interested in this subject to investigate the valuable discovery of Dr. Mackenzie, the Weber Semabach paradox, a finding confirmed by others.

Dr. Babbitt's remarks on the mental or interpretative side of hearing are most important. I tried to bring out this matter in my paper. As aurists we are interested primarily in the simple sensory phenomena of hearing in what we might call peripheral reception and in the effect of disease on this phase of hearing "central" hearing mental perception or interpretation lies in the domain of psychological investigation, where little progress has been made in putting comparative values on such factors as attention, fatigue and general intelligence.

As hearing tests are such subjective phenomena, it is impossible to separate our investigation of peripheral reception and central perception, for the simple sensory stimuli have to be reported by the patient's interpretation sphere. Variations in mental factors make great differences in the hearing findings. I am in the habit of remarking upon this side of the examination with a note at the head of my sheet, "Patient alert and intelligent", "Patient timid and uncertain", "Intelligence poor, mentally slow", etc. It is unfortunate that we cannot measure these factors exactly, simple test stimuli will greatly reduce their importance, as will careful testing technique.

November 4, 1924.

Paper: Retrobulbar Neuritis Attributed to Sinus Disease; Improvement Following Intranasal Surgery. Report of a Case. Dr. George L. Whelan.

DISCUSSION.

Dr. Ross H. Skillern: Gentlemen, it is a pity that this paper was not read before ophthalmologists, because they are the ones who see the patient first, and often when the patient is referred to us, it is too late to do them any good.

I have just read a paper in which there is a criticism on operations on the ethmoids and sphenoids. This paper laid especial stress on the fact that often no pus is found when the ethmoids and sphenoids are opened. It really makes no difference whether anything is found or not, so long as the patient gets well. We have a patient going blind and going very quickly and the longer the operation is postponed the more diminution in vision takes place. We must be alert to the seriousness of the blindness that follows and must spread a propaganda amongst the ophthalmologists that in good hands the operation is simple, without any complications and the end results that we are striving for are attained.

At times when the sphenoids and ethmoids are opened, nothing may be seen but only a few drops of serous fluid. It is this fluid under tension and pressure that produces the retrobulbar neuritis, and after a few days a thick creamy pus appears, it is then that we know that the patient is improving. Again I want to emphasize the importance of operating early in retrobulbar neuritis because when we temporize with this conditon we are playing with dynamite.

Paper: Catarrh or Sinusitis. Dr. Nathan P. Stauffer.

DISCUSSION.

Dr. Robert F. Ridpath: Mr. Chairman, I regret that Dr. Stauffer is not present as it is not fair to discuss anyone's paper without the author being present to defend himself.

Gentlemen: The word catarrh should be abandoned, as it does not convey any thought unless qualified by some other term.

Sinusitis means something, especially when prefixed by the name of the sinus involved, *i. e.*, maxillary sinusitis, frontal sinusitis, etc. The word catarrh means nothing.

We must not forget that the mucous membrane of the nose is continuous with the mucous membrane lining the sinuses, and any inflammation of the nose may provoke an acute sinusitis. Those of us who have immunity will throw it off rapidly, while the unlucky one will go on either to subacute or chronic sinusitis. In examining the nose where

the patient complains of dripping in the back part of the throat, we cannot call this catarrh. If there is a postnasal discharge it is due to involvement of the posterior ethmoidal cells or the sphenoids. While profuse discharge anteriorly is due to frontal anterior ethmoidal or maxillary sinusitis.

Paper: Focal Infection as a Factor in the Production of Neurolabyrinthitis. Report of Two Cases. Dr. Wm. G. Shemeley.

DISCUSSION:

DR. DOUGLAS MACFARLAN: Dr. Shemeley's paper is carefully complete with data; but there is so much data that it is difficult to follow with the mental eye. I think that the use of a chart of the Alexander type would set the matter more clearly before us.

One type of neuritis which is not frequently recognized, is that following operative procedures, such as antral punctures and tooth extraction. It is problematical whether this type is purely traumatic or toxic. I have in mind a number of cases in which antral disease had occurred, and where there remained a shadow on transillumination. These patients complained of facial aches which were distinctly neuritis, their trouble was brought on and continued by the repeated punctures made by a success of specialists. It is possible that with tooth extraction, especially where there is curettage, avenues of infection are opened and toxic neuritis follows.

The specific neuritis produced by drugs was well illustrated last year by case reports made before this Society by Drs. Mackenzie and Shemeley, it is not emphasized sufficiently here. I think it is well to ask every deaf patient if he has been under treatment for "rheumatism" or neuritis, or if he has been in the habit of taking asperin, the salicylates, or coal tars—acetanelid, phenacetin or antipyrin. Pohlman and Kranz determined the absolute value of toxic damage that these drugs produced in their poisoning effects on the acoustic nerve. With asperin in double dose, it required a 25 per cent increase in tone intensity to make hearing equivalent to normal, with sodium salicylate in double dose a 75 per cent increase in tone intensity. It is interesting to conjecture upon the selectivity of toxic drugs, whether or not in the case of the eighth nerve the vestibular or auditory branches can be affected independently, and whether or not this is a central or peripheral effect.

In one instance Dr. Shemeley reports the hearing of a higher tone than that of the fork used. I would suggest that this may have been no fault in perception, but the actual hearing of an overtone when the patient was deaf to the fundamental. This I have occasionally found.

I would like to ask Dr. Shemeley (in cases where the pathology has been of some duration) does he find that an accommodation takes place to the vestibular loss, giving subnormal or negative reactions to caloric and turning tests? Does the galvanic test of the labyrinth also give negative findings due to accommodation that takes place centrally? In working with all three tests I feel somewhat convinced that if the disease has existed for even the short period of a few months, accommodation may have so completely developed as to give no subjective symptoms nor objective findings. In considering vestibular records it is well to bear in mind that many cases showing loss will often show periods of aggravation—these periods are usually of short duration, but the reactions found are altogether different from those taken in the quiescent stage.

It is a pleasure to hear a paper gotten up with such care as Dr. Shemeley has given.

DR. HENRY WEIDER: In reference to the treatment of apical abscesses of the teeth, it is said by some authorities not to curette the pyogenic wall as it may cause a diffuse infection instead of a localized.

A thought worth while considering is the work being done by Meyer Solis-Cohen on infections of the rhinopharynx as isolated by the Cohen pathogen selective method or the Heist Lacey method in both of which the whole coaguable blood is used in the test.

DR. BENJAMIN SHUSTER: One of the most striking things about Dr. Shemeley's paper is the thoroughness and painstaking methods he employed in examining his cases. It is all too true that we cannot study cases of deafness too thoroughly. When we find cases for whom everything known is done and without results there certainly must be something which we missed.

One thing is not altogether clear to me and that is how we can say with certainty when a case of deafness is due to a focal infection. Perhaps I have been unable to follow Dr. Shemeley's thought rapidly enough. The average otologist will probably not encounter much difficulty in making a diagnosis of nerve deafness from conductive deafness, but I must say that one is at a loss to say definitely that such and such a case is of a focal infection origin. The labyrinthine tests have not altogether come up to expectations in helping us along these lines. The more we study these tests the more confusing they become, not so much because we cannot grasp them but rather we cannot explain their changeable reactions. For instance, one of the foremost exponents originally claimed that when we get a response from a set of canals in one plane and no response from the canals in the other plane it is pathognomonic of intracranial disease, and yet, recently, he states in a paper that this response is a good sign of acute mastoiditis.

In two two cases reported by Dr. Shemeley, both are cases of deafness, presumably due to focal infection, yet one case gives hyperactive labyrinthine responses, while the other subnormal responses. We might explain this by the fact that the accentuated responses are of an earlier manifestation, therefore more of an irritative than a destructive lesion. Well, one might ask why should there be a hyperactive response of the vestibular portion of the inner ear and a subnormal acoustic response, both being at the same stage of the disease.

This is not the only instance of paradoxical labyrinthine responses, in fact, there are enough instances to shake our confidence in their meaning.

Furthermore, we have all encountered cases that looked like deafness of focal infection, every other cause being eliminated by exclusion, and we do a certain amount of surgical treatment ilke tonsillectomy, submucous resection, attention to teeth and ethmoids, etc., and with no relief to the patient. Such cases are discouraging and certainly ought to stimulate to further study.

DR. GEORGE W. MACKENZIE: I arrived too late to hear a large part of Dr. Shemeley's paper. I do, however, know its essence.

In all cases of neurolabyrinthitis the history is very important as it will often suggest the etiology. Perhaps even more important is the functional hearing test findings, for it is these that tell us the location of the lesion. When the Weber is lateralized to the better hearing ear, the Schwabach (bone conduction on the mastoid) is shortened, the Rinne, positive or tending that way and there is reduction of hearing, especially for the high tones, we know the trouble is located in the perceptive apparatus. If, in addition to impairment of the hearing function, the patient gives the history of vertigo and equilibrium disturbance with diminishing of the after-turning nystagmus to the two sides, especially toward the affected side, we begin to think of involvement also of the vestibular nerve or vestibular labyrinth, or both, in conjunction with the cochlear nerve, cochlea, or both. Our next procedure, is to determine whether the galvanic reaction is positive or negative. If it happens to be positive we locate the lesion in the labyrinth, since the nerve must be intact. If the galvanic reaction happens to be negative we know that the nerve itself is involved and generally the end organ in the labyrinth along with it.

After establishing the diagnosis of neurolabyrinthitis from the above findings, the next move is to determine the cause. They are many. We may conveniently divide them into four groups. 1. The acute infectious fever, including influenza, typhoid fever, scarlet fever, measles, mumps, diphtheria, whooping cough, etc. 2. The chronic infections, syphilis,

tuberculosis, leukemia, leprosy, in fact anything that tends toward the production of granulomatous infiltration. 3. Exogenous poisons, lead, mercury, arsenic mercury, alcohol, ethyl and methyl, tobacco, illuminating gas, salicylates, quinin, the snake poisons, and many other poisons less well known. 4. Endogenous poisons, focal infections, autointoxication from unfavorable intestinal flora.

The history usually will tell us whether the patient has recently had one of the acute infections. Due to acute infections the involvement is usually bilateral and there is a tendency toward complete recovery. Due to one of the causes in the second group we have many things to help us clinically besides the aid of the laboratory. Concerning syphilis in the secondary stage, there is a neurolobyrinthitis with the neuritis predominating and the electrical reaction is negative, or decidedly diminished. As to the congenital form of syphilis, the labyrinth is involved *per se* and the nerve escapes. Therefore, the electrical reaction is preserved. The prognosis is more favorable in the neurolabyrinthitis syphilitica than in the case of labyrinthitis syphilitica tarda. As to the third group, the condition tends to be bilateral. The results are favorable if the cause is determined early and removed. A determination of the cause is made either from the history or by trying out the several poisons that can be produced in minute doses until an aggravation is noted, which establishes the diagnosis of the etiology. The fourth group includes those which may produce neurits elsewhere, namely, rarely focal infections. The teeth and tonsils are the most common sites of the focus; however, it can occur in almost any part of the body. One case I reported several years ago was due to a chronic appendicitis. The surgeon who operated the patient wrote to me that he had operated at least six other cases of the kind. In the cases of neurolabyrinthitis from focal infection origin the lesion is usually unilateral, while all other causes tend to produce bilateral affections.

The subject of neurolabyrinthitis is becoming one of increasing interest, due to its prevalence and the greater ease whereby we can diagnose its presence.

Dr. Wm. G. Shemeley, Jr. (closing): In reply to Dr. Douglas Macfarlan, 1, The Alexander Schematic Chart of plotting the tuning fork tests is of great value in the study of a case. If made with careful technique this test will give a clue as to the type of deafness.

2. In the study of focal infection, a system often overlooked by the otolaryngologist is the genitourinary system.

When cases are referred to us for study and we do not find any focal infection in the nose and throat, we must not forget the genitourinary system, pus tubes, seminal vesicalitis and hypertrophied prostrate.

In answer to Dr. Shuster about a variation in labyrinthine responses when they are due to focal infection, this is explained by the fact that in the early stages, the lesion is irritative and it requires less current to elicit response, while in the later or chronic stage with plastic exudate, more current is necessary to produce a reaction.

In answer to Dr. Weider about curettage of root sockets of teeth, I would say that until recently few dentists would attempt to pull a tooth so long as there was pus present. Today the teeth are pulled when there is abscess formation just the same as we incise when an abscess is present in any other part of the body. I believe the time is approaching when the dentist will be a physician who has selected dentistry as his specialty.

December 2, 1924.

Demonstration and Remarks Upon a Modified Adam's Forceps for Occasional Use in the Submucous Operation. Dr. Douglass Macfarlan.

Though we do not admit it, the average rhinologist doing the submucous operation is more or less annoyed when the operation reaches the stage of the removal of the vomer. These facts are true, 1, at this stage the patient's nerves are beginning to get ragged; 2, the anesthesia

may be wearing off; 3, chiselling is mentally distressing to the patient; 4, the vomer is tender; 5, the operator frequently has not a perfect elevation of flaps down to the floor; 6, a flap may be torn and a perforation feared. In this situation, the cartilage having been removed, there is sufficient room above the vomer to insure an excellent functional result from the mere fracturing of the vomer ridge upright. This may or may not be preceded by a few chisel blows to start the fracture line. The Adam's forceps is inserted, a blade in each nostril, outside, not inside the mucous flaps, the point of the instrument is directed down over the ridge and the instrument closed in a firm grasp. The fracture is done by a rotation of the forceps. Care must be used that the blades do not jump up over the vomer ridge and injure the flaps. Little damage is apparently done the mucosa over the vomer by the pressure. I have modified Adam's forceps so that each blade may be inserted separately, like an obstetrical forceps, then clamped after insertion. This I have found necessary in a number of cases in which it was impossible to insert the original model over a large ridge. Further, with the old instrument, the blades when opened for insertion, project out laterally at a 5 to 10 degree angle and strike the lower turbinates, which prevent insertion.

A Simple and Effective Method of Local Tonsillectomy. Dr. Henry Dintenfass.

It should be seen to that no active or acute inflammation of throat exists. Operation can be done at home. The patient to be observed for twenty-four hours. Unless very good reason, no blood clotting time taken. Calcium lactate often of no real value prior to operation. A half hour before the local anesthetic is administered, ¼ morphin sulphate, 1/150 atropin sulphate is given. Patient always operated on in sitting position. The anesthetic solution consists of ½ oz. of ½ of 1 per cent novocain solution. Cocain in any form is not used even to pain the area prior to needle puncture.

Instruments are: An all-metal syringe holding about 2 dr. and fitting into a needle which is ½ in. in length and of the standard screw thread type, having heavy walls of large bore, 18 or 19 gage, and reinforced by a shank. A Harris dissector. A tenaculum of the character of a Kyle or Kirkpatrick, with four rather heavy prongs and the catch removed, in place of which a piece of rubber tubing, slipped on over the joint of the instrument is substituted. A Tyding snare, threaded with a rather heavy piano wire (No. 9). A tongue depressor. A pillar retractor; several Kelly hemostats.

All the instruments sterilized by boiling, including even the needle, in preference to sterilization by immersing in solution like alcohol, lysol, etc. Method of injection is the infiltration anesthesia in which an effort is made to deposit the anesthetic solution directly behind the capsule of the tonsil, in contradistinction to the block anesthesia. The advantages of the former over the latter method are that operation can be begun immediately and the tonsil is being freed from the attachments beneath; usually one injection is all that is necessary. The needle is inserted just below the middle of the tonsil, at a point between tonsil and anterior pillar. In the actual removal the dissection method is used:

The tenaculum and the Tyding snare are held in such a way that the tenaculum goes right through the loop of the snare; the tenaculum takes a firm purchase of the tonsil, putting it on the stretch, making the line of its border stand out prominently and the sharp end of the Harris dissector is tarted from the upper pole of the tonsil between the anterior pillar of the tonsil proper and is carried downward, cutting all the tissues which are seen holding the tonsil. The plica is not saved.

If, in a small percentage of cases, on account of severe previous inflammation, a part of the tonsil, usually the upper pole, will not evert, then the blunt end of the Harris dissector is used with a twisting motion behind the remaing piece.

The application of the snare now follows.

DISCUSSION.

DR. STOUT: Dr. Dintenfass says that after fifteen years there is no contraindication for tonsillectomy under local anesthesia. I desire to say that in advanced tuberculosis of the lungs, especially in cavity formation, tonsillectomy is contraindicated.

I do not agree that it is a one-man operation. There are cases in which we meet unusual conditions and if we have no one to help us we find ourselves in a very unpleasant situation and fatalities may occur.

DR. STROUSE: Is it routine for Dr. Dintenfass to use morphin? I have long since discarded the use of morphin in conjunction with a local anesthesia for it is my belief the toxicity of the latter is thereby increased and I furthermore believe the indications for combining morphin with cocain or novocain should be exceedingly definite.

DR. WEIDER: Dr. Dintenfass' technique has proven satisfactory to me. Dr. Dintenfass has a way of inverting the tonsil that I admire. I have had more bleeding when I have had to cut the upper pole loose with a sharp knife. I have only taken blood clotting time for the past two years to guard against hemophilia. I have had more bleeding with cases showing short clotting time than with those showing a long clotting time. That may be coincidental, as the former greatly predominates.

I believe that calcium lactate is good. I recall a case recently where coagulation time was fifteen minutes and came down to five within a week by administering calcium lactate.

DR. COATES: I should like to ask Dr. Dintenfass why he does not place more faith in clotting time results, and what does he understand to be the difference between clotting time and bleeding time.

It seems to me that there may be a variation in the clotting time, depending upon the anatomical areas from which the blood is taken. In a case recently operated upon at the Medico-Chi Hospital, the resident and technician reported that the blood was not cloting at all, and in their anxiety to prevent a catastrophe the family learned of this. Howevr, I operated just the same and it seemed to me that there was less bleeding than in usual cases.

In regard to the quantity of novocain used, it is the least toxic drug of all local anesthetics that we have. Dr. Dintenfass speaks of the quantity, using 1½ dr. to 2 dr. for a tonsillectomy; he, however, fails to speak of the strength he employs.

DR. LAESSLE: In order to have the minimum amount of hemorrhage, Dr. idpath takes hold of the anterior pillar, makes an incision right back of the anterior pillar, gets the line of cleavage with a dull dissector, runs it upward and downward, takes hold of the upper pole of the tonsil, and draws forward downward until the lower pole is reached, and the snare is applied. Now, this snare is slowly contracted or tightened to give the blood vessels ample time to form a thrombus, thereby reducing hemorrhage to a great extent.

R. DINTENFASS (closing): In answer to Dr. Stout I would say, that while ordinarily it is a risk to operate upon tubercular patients, yet removal of tonsils under local anesthesia has often brought about in these cases remarkable results.

To his other question, it is to be remarked that there is absolutely no reason why an operation of this kind cannot be a one-man job.

In reply to Dr. Coates, according to Harold Hays, of New York, clotting time varies in different parts of the body and also in the different tests made.

Paper: Case of Chronic Purulent Otitis Media With Several Intracranial Complications. Dr. Benjamin H. Shuster.

DISCUSSION.

DR. G. W. MACKENZIE: There seems to be no doubt as to the correctness of the diagnosis in this case. The symptoms and test findings prove that the patient had a destructive labyrinthitis. As soon as one has made the diagnosis of a suppurative labyrinthitis it is safer to operate than not to operate. Furthermore, it is safer not to operate than operate

the mastoid and leave the labyrinth untouched. It has been my privilege to observe a large number of cases: fifty-one in a three-years' experience in Vienna and about thirty-seven of my own cases in this country. In no case where the diagnosis was made and the patient operated promptly was there a fatality. In those cases which were not operated, the mortality was fairly high. Two cases, not my own, where the mastoid was operated and the labyrinth left untouched, both died. The labyrinth, as you know, is in open communication with the intracranial cavity through three performed coutes: the internal auditory canal, the aqueductus cochleae and the aqueductus vestibuli. I have seen a case such as the Doctor reports in oral sphenoidal lobe. There appeared to be no connection between the two processes, but were both probably due to a common cause, namely, caries of the temporal bone. Furthermore, this case of Dr. Shuster's had presented the additional symptoms of a facial paralysis pointing toward bone destruction.

I congratulate Dr. Shuster for his excellent presentation of an interesting case.

Dr. Weider: I presented this patient to this Society about two years ago. He had T. B. of the larynx. He had absolutely no voice and was despondent. I cauterized about 100 times and eventually larynx cleared up. He had a hoarse voice. He gained weight and did very well, but was neglectful and developed a hemorrhage, after which he went steadily down hill.

I believe this was a T. B. mastoiditis, because he never complained of pain from his otitis media. He had one attack of mastoid irritation while under my care.

Dr. Shuster (closing): I did not operate in the active stage, because the possibility of the condition being a serous labyrinthitis was not to be overlooked. Later, when acute and threatening symptoms developed on the opposite, I did not feel that patient could stand a radical operation on both sides at the same time.

I did mention briefly that the labyrinthitis reactions were almost *nil* after the subsidence of the attack. If I recall correctly there were about five seconds after-turning nystagmus.

Tic Douloureux Cured by Mastoidectomy. Report of a Case. Dr. Henry S. Wieder.

Wieder's case occurred in a woman 38 years of age, who twelve years previous to her operation, had suffered from an attack of otitis media with apparent recovery, excepting for the fact that she never could lie on the affected side or wear tight hats. Five years later she began to suffer from typical attacks of tic douloureux affecting the mandibular branch of the fifth nerve. It was thought to be due to calcification of the nerves of her lower incisors, which were removed with no relief until the mandibular nerve was injected with alcohol. Following the injection of the mandibular nerve the patient's face was swollen for six weeks and pain began in the other two branches of the trigeminal. These attacks were typical and were increasing in severity and frequency until mastoidectomy was performed in an effort to relieve the tenderness over the mastoid and also relieve the facial pain. X-ray of the mastoid showed what appeared to be absorption of the bone over the lateral sinus.

Operation showed no definite pathology. There was a large cell at the site of the apparent absorption, but it could not be determined whether it was a normal developmental cell or the result of pathological change. It had no contents.

Relief from pain was immediate and permanent. The drooping of the right upper eyelid which accompanied the attacks of pain also disappeared. The patient has been entirely well for eleven months since the operation.

Wieder gives two possible explanations for the association between the ear condition and the tic douloureux and also reports briefly the only two similar cases he has been able to find in the literature.

Dr. Stout: Years ago I had as a patient an old lady who had suffered for a long time with tic douloureux. I could find nothing wrong with her nose, throat, or ears to account for it. She was under the care of a nerve specialist and because of her advanced age nothing was advised surgically. She accidently fell down stairs and was terribly shaken up, but her tic douloureux disappeared, and as far as I know, did not recur again. The nerve specialist was asked of he could account for this and he said he could not.

Dr. G. W. Mackenzie: I wish to call Dr. Weider's attention to the two cases belonging to the same group, which I presented to this Society about two years ago. In both of my cases, however, there was a fluctuating temperature suggestive of thrombophlebitis. I could not for a few minutes put together a severe fifth nerve neuralgia with a temperature curve suggestive of pyemia, until it occurred to me that the superior petrosal sinus lies in close proximity to the Gasserion ganglion on the superior surface of the pyramid near its tip. I fail to grasp the relationship between the third nerve nucleus and the seventh nerve nucleus by way of the posterior longitudinal bundle. The posterior longitudinal bundle connects the nuclei of the vestibular eighth, particularly the Deiters nucleus, with the nuclei of the sixth, fourth and third nerves. The nucleus of the seventh nerve is more ventralward and in the course of its fibres it loops round and over and lateralward of the sixth nerve nucleus and is not in communication directly or indirectly with the posterior longitudinal bundle or the third nerve nucleus in the brain stem.

Dr. Weider (closing): The third nerve gives off fibres that are connected with those of the seventh nerve. I quote Morris, Obeosteiner and Oppenheim.

J. H., Philadelphia, age 3 years, white, male. Family history: Mother and father living and well. Previous history: No illness. Chief complaint: Swallowed penny. Brought immediately to hospital, Aug. 25, 1924. Began vomiting. Heart and lungs normal. X-ray showed the position of the coin, in the esophagus just below the suparsternal notch. Efforts to remove the coin were made the same day but were futile.

Operation: Aug. 26, 1924, Dr. Stout. With a Jackson's child-size esophageal speculum, combined with the direct fluoroscope examination the penny was easily found and delivered by way of the mouth. Time, less than three minutes. The child left the hospital the next day. Pulse and temperature normal.

Medicine: Bicarb. Soda gr. X, every hour for four doses; also, Morph. gr. $\frac{1}{6}$; At. S. gr. 1/400, Hypd., one hour before operation.

Comment: Doing this operation in the X-ray room with the fluoroscope examination proceeding while the penny was found and grasped made the operation so easy that it was really a delight to do it. The esophageal speculum is one of the most remarkable of all the instruments that Dr. Jackson has devised.

Disadvantages in using the fluoroscope: The room must be pitch dark, which may frighten a child—and it is a little difficult to tell the condition of the child. A small flashlight helps to see the face. Again, you might come in contact with some part of the wiring or the apparatus and get a shock. Suggest not to move around too much in the dark, and have everything ready before turning out the lights.

Advantages in using the fluoroscope: Most foreign bodies in the esophagus are opaque or can be made so to the fluoroscope, so you can see when your speculum gets near the object; therefore, riding over it is not likely to occur—if it starts downward while you are inserting the instrument this also can be seen. You will not spend one-half hour looking for the foreign body that has gone down to the stomach. If there is more than one object this can also be seen. Finally you can see the object come up with the speculum, or, if it slips off, you can see it in its new position.

This is a method that any laryngologist can master and do in the hospital where there is a fluoroscope. No specially trained assistants, except the Roentgenologist, are required.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

THROMBOSIS OF THE SUPERIOR THYROID VEIN FROM A CERVICAL ABSCESS, BETWEEN LARYNX AND THYROID. DIAGNOSIS MADE AT AUTOPSY.*

DR. HILL HASTINGS, Los Angeles.

Deep cervical abscess, the result of acute inflammation of the throat, has caused serious concern to the laryngologist largely because of the danger of death from edema of the larynx. Goodman (Annals of Otology, Rhinology and Laryngology, June, 1917) and later, Mosher, (THE LARYNGOSCOPE, June, 1920) have called attention (each, one case) to the unlooked for complication of thrombosis of the internal jugular vein. I wish, by the report of this fatal case, to make a contribution to this subject by calling to the attention of laryngologists the possibility of still another complication, *thrombophlebitis of the superior thyroid vein,* without involvement of the internal jugular vein.

According to Spalteholz (Atlas of Human Anatomy by Werner-Spalteholz, Vol. II, page 446) "The V. V. thyreoidea superiores, usually, two, accompany the artery only in part, one opens far below, the other above in the neighborhood of the A. thyroidea superior". The one that empties below, begins its course in the space between the postero-inferior angle of the larynx and the lobe of the thyroid gland, runs a long course downward close to the lateral wall of the trachea, enters the thorax under the clavicle; empties by

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way of a short trunk (the v. Thyreoidea Ima) into the V. Aonony-ma Sinistra, and thus into the V. Cava Superior.

The drawing, accompanying this report, is made from the plate in Spalteholz Anatomy, changed only in one respect, that the vein above described is darkened to show the thrombophlebitis that was found at autopsy. Had it not been possible to secure an autopsy in this case, the correct diagnosis would not have been made—a not uncommon observation. Furthermore, following the reports of Goodman and especially that of Mosher, to have opened the neck, before death, with a preoperative diagnosis of internal jugular thrombosis, would have resulted in failure for this vein at autopsy was found to be normal.

Permit me to anticipate the clinical history and autopsy findings by calling your attention to the unusually rapid progress of the disease in this case. In five days after I saw the patient he was dead. Three days previously he had had a chill, followed by a high temperature, and an acute hemorrhagic nephritis. His preliminary symptoms were unusually mild—slight soreness in the neck, about the level of the larynx, like the tenderness of a lymphatic gland so often found after a slight sore throat. Examinations by myself and other consultants failed completely to make out any cervical abscess, enlarged gland or induration of any kind, although the phlebitis and thrombosis was completely established.

Clinical history (by Dr. P. G. White) as follows:

Sept. 17, 1921, F. A., age 38 years. *Past History:* Has always been very robust except for tubercular pleurisy fifteen years ago. Has had no trouble in this respect since that time. Has had frequent colds. Bronchitis three months ago, cough persisting for some time. Was seen by Dr. P. G. White two months ago for cough. This gradually cleared up within a week or ten days. Examination of chest at that time was negative except for impaired resonance over the left chest posteriorly, probably due to an old thickened pleura. An occasional rhoncus was heard. Sputum negative for tuberculosis.

Present Complaint: Patient was feeling in his usual good health until Saturday, Sept. 17; went to business as usual. Complained of a slight soreness in the *left* side of the neck anteriorly. None of the symptoms of acute respiratory infection; in fact, had no other complaint except this soreness in the neck. On Sunday, Sept. 18, patient felt the same as usual with the exception that this pain in the left side of neck was a little more marked. Went to the beach Sunday

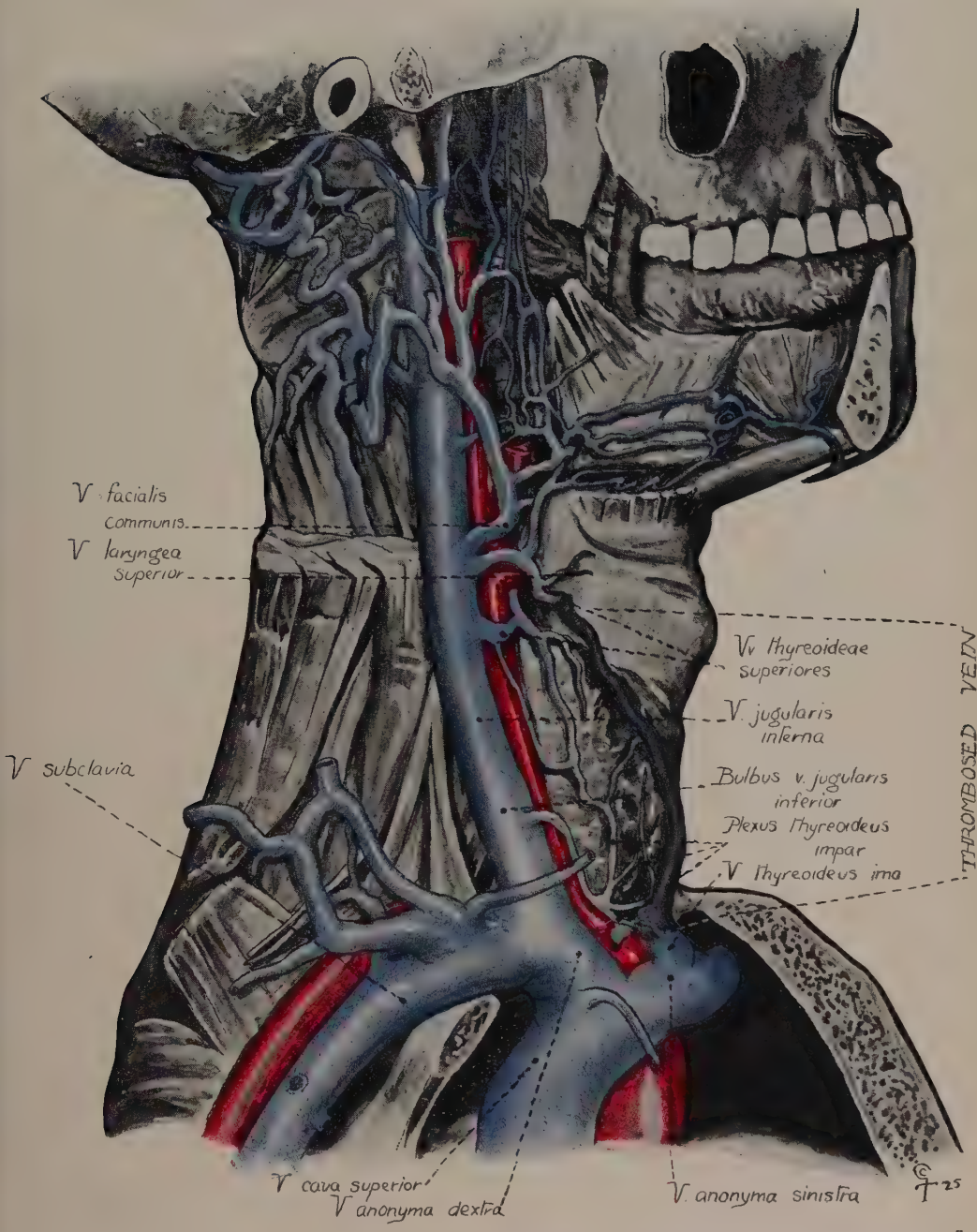
noon to attend a dinner party. While there the pain in the neck became very severe, spasmodic, sharp, shooting pains coming in the *left* neck anteriorly at the level of the thyroid, one or two inches external to midline. Accompanying this spasmodic pain their were severe contractions of the sternocleidomastoid muscle, which were relieved by patient throwing his head back. Remained at the beach during the day, returning home that night. Apparently had no fever, no sore throat, but had a slight huskiness of the voice, which cleared up with a slight hacking cough. Slept most of the night, although at times was awakened by this spasmodic pain. The next day was seen by Dr. White. Patient was having sharp, spasmodic, shooting pain in the left side of the neck anteriorly. Voice decidedly husky, but when clearing the throat was apparently normal; temperature normal.

Examination revealed marked tenderness on pressure over the tendon of the sternocleidomastoid muscle about 1½ inches above the clavicle. No sign of induration or palpable mass. Chest, negative; pulse, 76; heart, negative; nose, throat, larynx, negative; diphtheria culture, negative; ears, negative.

Diagnosis; at this time was inflammation of a deep-seated gland lying under the sternocleidomastoid which produced a spasm of this muscle. Origin of the infection was undetermined. Examined carefully for infection of the jugular vein but no evidence of such an infection could be found. Prescribed capsule containing 4 grs. of aspirin and 1-10th gr. of codein. Heat applied to neck. That evening patient felt more comfortable, although continued to have spasmodic pain, but less frequent and less severe than formerly. Later on in the evening while patient was playing cards was suddenly seized with a chilly sensation lasting 3 or 4 minutes. Temperature not taken at that time. Stopped playing cards, went to bed and asleep.

The next morning (Tuesday, Sept. 20) at 9 o'clock temperature was 99.° Had had a good night, very little pain or spasm. Tenderness over the area previously described persisted. There was also tenderness in the midline over what appears to be the isthmus of the thyroid. No swelling or induration to be felt anywhere. No general aching pains. No cough. Voice still slightly husky. Examination showed the upper respiratory tract to be negative. Heart was negative. Continued with capsules and heat to neck. At 3 p. m. nurse called on case. At 3 p. m. temperature 99.2,° pulse 88, respiration 20. At 4 p. m. complained of severe pain in the neck. Had

osteopathic treatment to back of neck during the evening. At 6 p. m. temperature 100,° pulse 88, respiration 20. Dr. Bowers (Dr. Hastings' assistant) made examination of ears and upper respiratory tract and could find nothing abnormal. Wednesday, Sept. 21, in the morning felt much better. Very little pain in neck. No spasm. Able to move neck from side to side and up and down without pain. examination revealed tenderness over the left side of the neck but less marked than the previous day. Tenderness over the isthmus of the thyroid still present. Huskiness of voice disappeared. Nothing abnormal found in throat. 7 p. m., temperature 99.6;° at 9 p. m., temperature 99,° pulse 80, respiration 20. At 1:30 a. m., temperature 99.6.° Had *second osteopathic treatment* to back of neck at *1:30 p. m.* At *3 p. m. had chill;* temperature 102.6,° pulse 88, respiration 20. At 4 p. m., temperature 103.8,° pulse 96, respiration 20. At 5 p. m., temperature 102.6.° At 5 p. m., when temperature started to go down, patient was bathed in *drenching sweat.* At 11 p. m., temperature 102.6,° perspiration still continuing. The pain in the neck had almost entirely disappeared. Tenderness, especially in the midline and over the sternocloidomastoid at the level of the thyroid, still present. No induration. That evening vomited. Complained of headache, chiefly temporal and frontal. No evidence of a meningitis, such as rigidity of the neck or photophobia. Pupils equal. No Koenig. No change in reflexes. Give 1¾ gr. of calomel and 15 gr. of aspirin. Urine micoscopically showed *blood* and *albumin.* Thursday, Sept. 22, had a restless night, *vomiting frequently.* At 1:30 a. m., temperature 101.6,° pulse 90, respiration 22. At 8:15 a. m., temperature 98.2,° pulse 76. At 8 a. m. had a *severe chill* lasting 35 minutes. Temperature rose to 101.3,° pulse 96, respiration 24. This was followed by profuse *sweating.* Temperature remained elevated until 3 p. m., when it was 101.8,° pulse 100. At 5 p. m. it was 99.8.° Saturday, Sept. 24, slept eight hours. Awakened at 5 a. m. with nausea and vomiting. At 6:15 a. m. had chill, which lasted nine minutes. (Heroin gr. 1-16 administered at onset). Temperature gradually rose, reaching 101.4° at 8 a. m., pulse 88. This morning for the *first time* patient complained of *soreness* in the *right side* of neck with very *definite tenderness* in the same region on this side of the neck as was formerly in the *left side.* (Sept. 24) Urine very *scanty* and *bloody.* Blood pressure 100/70. At 6 p. m., very *drowsy, vomiting,* temperature 101.° At 9:30 p. m., had a very *severe rigor* followed by an elevation of temperature to 106.2° (rectal), which fell to 102.8° by 12 o'clock and 99.4° (rectal) at 5 a. m., pulse 72, respiration 24.



(Drawing made from "Spalteholz Atlas")

Sunday, Sept. 25, soreness in the *right* side of the neck. Temperature at 9 a. m., 98,° pulse 80. 10:30 a. m., had a very *severe rigor* lasting 20 minutes. During this chill had acute pain in the left side of the neck over the sternocleidomastoid muscle. No radiation. Urine *still bloody,* freer. Following this chill temperature rose to 104.2,° followed by moderate sweating. Consultation with Dr. Hill Hastings, Dr. Geo. McCoy, Dr. Harold Smith, Dr. E. C. Moore, Dr. R. B. Hill and nothing tangible could be found to account for the *evident septicemic* condition and acute nephritis. Considerable *discussion* about the possibility of *opening* the *neck.* The consensus of opinion was strongly against doing so as nothing *definite could be found on examination.* During the afternoon temperature went down to 99.4.° Patient slept most of the time. That evening temperature went to 101.8,° but had no definite chill. Complained during the evening of neck being very sore on both sides. Urine much more free, voiding 53 oz. in twenty-four hours. Leucocytes 13,200, polys 91 per cent. On three or four occasions during the following three days, patient had slight cough and expectorated a small quantity of tenacious, bloody mucous, the blood being right. Condition gradually grew weaker, no new symptoms developing, and on Sept. 29 the patient died.

Laboratory report: Urinalysis: 5th day, Sept. 22, 1921, F. tr. alb. and mucous, otherwise negative. Sixth day, Sept. 23, trace of alb., hyalin and granular casts. Otherwise negative. Seventh day, Sept. 24, very smoky. Loaded with r. b. c. and blood casts. Ninth day, Sept. 26, heavy trace of alb. Trace of bile. Loaded with r. b. c. Tenth day, Sept. 27, trace of bile, many r. b. c. and casts.

Blood: Wassermann done at another laboratory was negative. Fifth day, Sept. 22, leucocyt. 5,800, polys. 93, lymphs. 6, monos. 1, trans. none. Sixth day, Sept. 23, leucocyt. 8,600, polys. 92, lymphs. 6, monors. 1, trans. 1. Eighth day, Sept. 25, leucocyt. 13,400, polys. 96, lymphs. 4, monos. none, trans. none. Tenth day, Sept. 27, leucocyt. 19,000, polys. 88, lymphs. 10, monos. 2, trans. none.

My examinations were absolutely negative, except for small, chronically infected tonsils. There was no pathological condition found in the throat, larynx, trachea, nose and paranasal sinuses or ears. The patient was normally very thin; the neck, long and thin, permitted unusually good palpation. There were no enlarged glands; no induration along the trachea from the larynx down where the tenderness was so acute. At my first examination the cervical tenderness was on the left side; later on the right side, elicited by pressure on the lateral wall of the trachea. This physical sign, together with

the expectoration of bloody secretion on two or three occasions during the illness gave rise to a probable diagnosis of a tracheal ulceration, which was ruled out.

Post-mortem examination of body (by Dr. R. B. Hill):

"General Appearance—The body is that of a large framed, moderately well nourished, young adult male. There is a distinct lemon tint to the skin. Two old inguinal scars. No other markings.

"Peritoneal Cavity—There is no free fluid and nothing abnormal noted.

"Pleural Cavities—Pleura of both lungs covered by thin, fibrinous adhesions. Many old adhesions in the left side.

"Pericardial Cavity—Contains about 75 c.c. of clear fluid. The layers are roughened and covered by a fibrinous exudate similar to that in the pleura.

"Heart—The heart is about normal in size. The muscle is soft and pale. The endocardium is smooth. The *valves* show no evidence of *disease.*

"Lungs—Both are edematous and markedly congested. There are several old *healed* tubercles in the *apex of the left lung.* The bronchi are congested.

"Liver, stomach and duodenum—The liver is larger than normal and shows a very marked acute passive congestion. The stomach is filled with clear fluid, the mucosa is congested. The duodenum does not show any changes.

"Intestines—The intestines, especially the jejunum, have a very dark colored appearance and are filled with a semi-clotted bloody material. The mucosa is markedly congested but there are no ulcerations. The *Peyer's patches appear normal.*

"Spleen: The spleen is one-third larger than normal, is firm and the capsule is somewhat thickened. On section the pulp is soft, dark reddish brown in color and seems to contain an abnormal amount of blood.

"Kidneys—The kidneys are about equal in size, *markedly swollen* and on section are quite *dark in color* throughout; the cortex is swollen; the capsule strips readily, leaving a smooth surface over which are many *small punctuate hemorrhages slightly larger than a pinpoint.*

"Ureters, bladder and prostate—Show no evidence of disease.

"Neck—On dissecting the muscles from the thyroid gland the thyroid veins are seen to be distended, dark in color and quite *rigid*. On opening the veins they are seen to be filled with a thick, rather dark watery pus. The thyroid gland seems normal. Just behind the upper pole of the left lobe of the thyroid gland is an abscess which contains about 15 c.c. of dark, thin, watery pus, which has a fetid odor. The *abscess* walls are formed by *the triangle* of the thyroid gland, esophagus and trachea, the upper margin being at the level of the cricoid cartilage. The *wall of the esophagus in contact* with the abscess is necrosed almost down *to the mucosa*. There are no evidences of ulceration in the esophageal mucosa or the mucosa of the trachea or larynx.

"The internal jugular veins are normal."

The cervical abscess found at autopsy was believed to be an old tubercular gland, reinfected by pus organisms from a chronically infected tonsil, or from a mild (clinically) pharyngitis or laryngitis. From this abscess, thrombophlebitis of the superior thyroid vein resulted, with rapid dissemination of septic emboli throughout the body.

As to the operative indications and the possibility of having prevented by operation the fatal sequelae, the lesson from the autopsy was that this patient's life could have been saved only by searching for a septic focus early in the course of the disease. At that time he did not seem to be sick. His first chill, in the light of the autopsy, is believed to be the result of a shower of septic emboli, which lodged in the kidneys, pleural and pericardial cavities. The possibility of a cure by operation was then too late. The shifting of the pain and tenderness from the left to the right side of the neck was, of course, confusing. This was explained only by finding at autopsy the thrombophlebitis of the descending superior thyroid vein.

RETROBULBAR NEURITIS ATTRIBUTED TO SINUS DISEASE; IMPROVEMENT FOLLOWING INTRA-NASAL SURGERY. REPORT OF A CASE.*

Dr. George L. Whelan, Philadelphia.

This paper does not attempt to solve the problem of the treatment of retrobulbar neuritis of sinus origin; neither can it be claimed that it offers anything new in reference to the etiology, pathology or treatment of the condition under consideration. Its chief object is to present as impartially as possible the data advanced by certain writers, since rhinologists differ in their views regarding retrobulbar neuritis and especially with reference to its treatment.

A knowledge of history is a most distressing thing, for it discloses persistently that one or another supposedly new discovery is in reality only a rediscovery. We must take consolation in the fact that generally the first steps in a new field were but halting ones and were not backed by sufficient force of actual knowledge to permit the early investigators to reach their goal and hence our newer progress on a more substantial basis is after all the only worth while advance.

That the sphenoid sinus or ethmoid cells when diseased may cause an optic neuritis was recognized in 1892, when Caldwell reported a case of optic neuritis due to sphenoid and ethmoid disease, and Krause, in 1895, reported three cases of retrobulbar neuritis, supposedly due to an extension from sphenoid sinus disease.

Pathology: While it may seem elementary to review the pathological anatomy associated with retrobulbar neuritis, we are giving a brief résumé, even at the risk of repeating facts well known to many.

The optic nerves occupy a vulnerable position in the presence of suppuration in the posterior nasal sinuses. Postmortem examinations bear out the contention that sphenoidal sinus disease is by no means an uncommon affection. From an anatomic standpoint, it has been shown that the optic nerve bears no constant anatomical relation to the sphenoid sinus and posterior ethmoidal cells. It would seem that the easiest route for the propagation of an inflammatory affection of the sphenoid sinus is directly by way of the thin bone of the sinus wall—by way of strands of fibrous tissue and small veins which run through the bone of the sphenoidal walls. Another possible route

*Read before the Philadelphia Laryngological Society, Nov. 4, 1924.

of direct extension is by way of the carotid tract. We must also bear in mind the possibility of direct absorption of products from the sinuses through the roof as well as through the lateral walls into the arachnoid cavity, and by this path to the nerves, or by hyperplasia of the sinus, which is described by Skillern[1] as a rarefying ostitis associated with an inflammatory swelling.

It is not impossible for an infection producing little or no change in the macroscopic appearance of the sinus mucosa to cause a neuritis in the more delicate and less resistant structure of the optic nerve. Young[2] states that in thirty sphenoidal sinuses dissected from the base of the skull in the recent state, in unselected cases at necropsy, there were in four cases one or more hiatuses in the bone separating the optic nerve from the sinuses, while in one specimen there was more hiatus than bone. It is quite possible that the nerve in such cases would be involved in an infection of the sinus mucosa. As the optic nerve in its canalicular course is separated only by a thin bony plate, often with dehiscences from the sphenoid sinus and posterior-superior ethmoid cells, it is easy to understand how it may be affected by disturbances in the neighboring sinuses.

Syme[3] does not now consider it necessary, before undertaking operation, to find pus in the superior nasal meatus. If there is a suggestion of crowding in the upper part of the nose, whether the crowding is by the septum or by an enlarged or unhealthy turbinate, he considers that operation is indicated.

One may be reasonably sure that in cases of optic nerve involvement, where other possible sources of infection, such as teeth and tonsils have been eliminated, operation on the sinuses will prove successful in a large proportion of the cases.

Most cases of retrobulbar neuritis, particularly those unilateral in type, have their origin in disease or suppuration of the sphenoid sinus. Holmes[4] says 40 per cent of eye diseases have their origin in diseases of the nasal sinuses. The visual changes which have been noted in this condition are recorded by Tranquair[5] as follows: *1* Changes reported as occurring in patients whose symptoms have brought them in the first instance to the rhinologist, who passes them on to the oculist. The visual changes are usually not complained of but are found on proper examination. *2* Changes found by the oculist in patients complaining of visual symptoms and headache, and in whom sinus disease is subsequently discovered by the rhinologist.

Stark's[6] classification of the pathology of retrobulbar neuritis resulting from sinus conditions is as follows: Infection of one or

more of the nasal sinuses, usually the posterior group, with interference of drainage, through the natural opening caused by anatomic obstruction, or by swelling. This condition may exist for years and result in thickening of the mucus membrane, the development of a periostitis, an osteosclerosis or an osteoporosis. He advances a new theory as to the pathology of sinus disease, *i. e.*, the sensitization of the tissues of the sinus by bacterial proteins producing an allergy, which results in a localized anaphylactic reaction each time the individual comes in contact with a fresh infection of the nose; which together with any variation in the normal anatomy of the nasal sinuses brings them in closer relation to the optic nerve, resulting in an optic neuritis.

Diagnosis: The diagnosis must be considered from the standpoint of eye symptoms and from that of pathological conditions of the nose. Total optic neuritis is generally a complication associated with suppuration of the posterior sinuses. In the nonsuppurative cases there may be retrobulbar neuritis with vague disturbances of vision. There may be pain on ocular pressure, or paracentral scotoma, with enlargement of the blind spot.

The changes most often reported in patients who have been examined first by the rhinologist are enlargement of the blind spot, peripheral contraction of the visual field and central scotoma, but the exact relationship of these findings to the associated nasal sinus disease remains as yet undecided. Important as are scotoma and enlargement of the blind spot, they are not symptoms of sinus disease, but of optic nerve affection. They show us that the optic nerve is diseased, but they reveal nothing as to the origin of the infection. We must not lose sight of the fact that every retrobulbar neuritis may begin with these symptoms, whether due to multiple sclerosis, syphilis or tuberculosis.

The eye symptoms are the first to attract the patient's attention. When the ocular change comes on suddenly and is pronounced, the diagnosis can be made more readily than if the onset of the symptoms is slow and progressive. Rhinological examination rarely reveals pus, polypoid changes or a history of nasal discharge. If on examination, a slight departure from the normal is found, such as a slight increase in moisture, a congestion of the mucosa on one side, a little edema of the middle turbinate, hypertrophy of the middle turbinate or deviation of the septum, this is enough pathology to cause neuritis.

White,[7] in a series of thirty-three cases, found a deviation of the septum pressing on the middle turbinate with hyperplasia of that part

as the most important pathology. Grant[8] records two cases of retrobulbar neuritis in which the affection subsided after removal of hypertrophied middle turbinate bodies.

When there is a direct extension of the infection from the sinuses to the sheath of the nerve, and also in cases of toxemia from infection in the sinuses, a diagnosis may be made by rhinologic examination and X-ray findings. Optic neuritis as a result of hyperplasia, however, is very difficult to diagnose as intranasal examination shows little pathology and as a rule the roentgenologic findings are negative. In such cases, if all other possible causes can be excluded, one is justified in operating on the posterior ethmoids and sphenoids.

We recognize the fact that sinus conditions can cause the above-mentioned eye findings, because cases are recorded in which enlargement of the blind spot and central scotoma were found, and in which these conditions decreased or vanished after treatment of the sinus affection and recurred with each subsequent infection of the sinuses.

The problem before us at the present time is the building up of a clinical picture of rhinogenic retrobulbar neuritis. It will be necessary to collect all the facts in regard to history, age, sex, mode of onset and associated symptoms, while the progress and subsequent history of cases coming under observation should be watched indefinitely.

Prognosis: It may be well to analyze the term "prognosis", by which we understand the prediction of the course of a disease. It is possible to make a prognosis only when we have exact knowledge of the disease itself, the condition of the diseased sinus, and the influence of the treatment. Briefly, then, we may say that the prognosis depends upon how long the condition has existed previous to the time when the patient presents himself for examination, how far the blindness has advanced and the promptness with which the condition is recognized and operation is performed.

Gallagher[9] says that atrophy of the optic nerve can occur within fifteen to twenty days from the beginning of its involvement; therefore examination should be made promptly and no time should be lost before operation. If the condition is caused by toxic absorption, edema, stasis, slight inflammations, or slight pressure, and is recognized early, the outlook is favorable. If, on the other hand, the affection is of long standing with the possibility of more extensive inflammation, the prognosis is decidedly unfavorable.

The operative procedure must be suited to the particular case. Conservative measures may give relief in some cases; perhaps it may

be well to try the intranasal conservative measures first. If they do not afford relief one must then resort to the more radical procedures. However, when such patients are seen by rhinologists, the general trend seems to be to act promptly—to remove deviated septa, middle turbinates which appear to be diseased, and posterior ethmoidal cells and to open the sphenoid sinus.

Report of Case: G. U., a woman, age 23 years, referred to Dr. Ross H. Skillern's clinic, Medico Chiurgical Hospital, Nov. 29, 1923.

Diagnosis, monocular left optic neuritis. Right fundus negative.

X-ray findings, frontal sinuses clear, ethmoids both sides occluded with exudate. Sphenoids clear. Right maxillary sinus opaque, probably occluded with exudate. Blood Wassermann negative. Urine analysis negative.

History: Pains over left frontal and occipital regions for past six weeks. Field report of the left eye by Dr. Monroe showed marked enlargement of the blind spot and a large scotoma in the upper nasal quadrant. The form field showed a notch in the upper nasal quadrant almost merging with the top of the scotoma. The fields for color were markedly cut.

Rhinoscopic examination disclosed a hypertrophied left middle turbinate. Antrum puncture is negative. It was impossible to probe the sphenoid cavity. Immediate operation was advised by Dr. Griscome, and on Nov. 29, 1923, middle turbinectomy was performed under cocain-adrenalin anesthesia.

After this operation the field showed some slight improvement, which was followed, however, by a rapid increase in the blind area.

Dec. 28, 1923: The posterior ethmoid cells were exenterated and the anterior sphenoid wall was punched out. The fields were examined weekly and the affected one showed steady improvement until Mar. 5, 1924, when it was noted that the blind spot was still somewhat enlarged and that there was a narrow relative scotoma extending upward and inward from its upper border. The form field was full; the color field showed a cut in the upper nasal quadrant.

Mar. 12, 1924: Rhinological examination revealed a curtain-like covering of mucous membrane over the anterior sphenoidal wall. This was removed, with the hope of restoring the visual field to normal. There was little change, however, effected in the field as a result of this attempt.

July 1, 1924: Examination of the left ocular field showed blind spot slightly enlarged. Two small absolute scotomas had replaced the relative scotoma. The form field was full, but the color field still showed a cut in the upper nasal quadrant.

It is of interest to note that with each fresh infection of the nose, or when she was depressed or fatigued from loss of sleep, worry or a menstrual period, marked changes were observed in the field, which always showed improvement after treatment and rest.

CONCLUSIONS.

Every case of retrobulbar or intraocular neuritis, which does not show improvement under general or local treatment, should be submitted to surgical treatment without further delay.

Co-operation between the ophthalmologist and rhinologist after a roentgenographic examination has been made would seem to be the logical procedure in all cases of optic nerve change, regardless of the cause.

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257 South 16th Street.

FOCAL INFECTION AS A FACTOR IN THE PRODUCTION OF NEUROLABRINTHITIS. REPORT OF TWO CASES.*

Dr. William G. Shemeley, Jr., Philadelphia.

Of the twelve cranial nerves there are two which seem to be peculiarly susceptible to toxic productions. They are the optic and the auditory nerves. These toxic products may be either of endogenous or exogenous origin.

The exogenous toxic substances are those such as lead, arsenic, mercury, quinin, the salicylates, illuminating gas and wood alcohol, although wood alcohol shares a greater selective affinity for the optic nerve.

The endogenous poisons are produced within the patient's own body, as a result of bacterial morphology. Such conditions as diseased teeth and tonsils, chronic pathologic processes with pus formation and retention in any of the organs of the body, lues, diphtheria, the various exanthemata and the infectious fevers are capable of causing neurolabyrinthitis of the eighth cranial nerve.

The reason or reasons why wood alcohol generally affects the optic nerve and quinin the auditory nerve has not as yet been explained. Neither has the fact that focal infection of the same type may spend its greatest force upon the auditory nerve of one individual and upon the optic nerve of another. Frequently the same person gives a history and presents clinical evidence of first having had the second cranial nerve affected, and subsequently had this followed by involvement of the eighth cranial nerve or vice versa.

Does it not seem reasonable to expect chemistry to solve this problem of the selective affinity of certain provocative causes? Perhaps this may lead us to the endocrines and their effects in the production or prevention of diseases. But this is theorizing and theorizing is fraught with dangers to the investigator, for it frequently causes him to roam far afield and leaves him lost in the wilderness of his own creation.

The relation of focal infection to the production of neuritis in the auditory nerve is becoming better understood. The general medical man is more on the alert and he recognizes the importance of careful diagnosis in the patient with vertigo or diminished hearing or both.

Where the condition has been found to be due to conditions in or about the teeth, another problem has had to be overcome. All too frequent do dentists fail to extract teeth in a thorough surgical man-

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ner. It is not sufficient in a case of advanced periapical abscess to merely extract the tooth. In addition, if good results are to be expected, the diseased socket of that tooth must be thoroughly cleaned up by means of the curette until healthy structures are encountered. Until otologists have secured this painstaking co-operation from the dentists, there will be frequent failures to obtain the maximum amount of relief following dental procedures.

This is but another fact that shows the necessity of dentists first being trained as medical men and subsequently selecting dentistry as their specialty. Already this is required in Italy and France—the necessary laws having been passed.

Two cases are offered for consideration:

Case No. 1. Male, age 74 years; office record No. 5958. First examination Sept. 26, 1924. The following is the history obtained from both the patient and his wife together with the findings at the time of the examination: Mr. P., according to his wife, has used the Politzer bag for a good many years with a great deal of benefit. About eight years ago patient had a tooth extracted, upper left back tooth, presumably for pyorrhea. Following the extraction the patient developed empyema of the antrum, which drained from the socket of the extracted tooth. Later he had retention symptoms with the drainage of pus through the nose. The attending physician later drained the antrum through the inferior fossa. Since that time patient has had no trouble of this kind. Descriptions of dizziness by his wife, who is a physician—came on one morning. The nystagmus was very pronounced. The first day nystagmus was to the left, horizontal. The following day it became rotary. Dizziness lasted three or four days. Last winter patient, in walking, would stop and grasp wife and say he was dizzy. This would last but a few seconds. During April extreme deafness came on in morning (left ear); lasted a few days and then hearing returned to normal, or as good as it was before. Five weeks ago nystagmus again set in. Between two and three weeks ago patient became totally deaf again, which lasted a few days and again came back to normal, or as formerly, but Mrs. P. feels that there has been some loss of hearing since first attack. Right ear deaf. Complains of headache (localizes it on left side of head (especially more severe on left than on right side. Pain seems indefinite. Patient has had ringing in ears of long standing, but the more deaf he is the more annoying are the noises.

Blood pressure systolic, 110. Urinalysis normal. According to Mr. P.'s attending physician, there is a "slight amount of arteriosclerosis", but this was thought allowable for patient's age.

According to Mrs. P. there is *1*, occasional subconjunctival hemorrhages; *2*, gradual loss of weight; *3*, "decided change of disposition, formerly good natured, lately gets brain storms", according to the patient's own opinion.

Blood pressure: Systolic 170; diastolic 115; pulse 55.

Functional Hearing Test—Right Ear: Conversational speech, not heard; whispered speech, not heard; acumeter, negative. Weber, not lateralized. Schwabach, normal. C_1, low fork, not heard; C_4, high fork, not heard. Air, not heard. *Left Ear:* Conversational speech, 5 meters. Whispered speech, not heard. Acumeter, ad conch. Weber, not lateralized; Schwabach, short 10 seconds; Rinne, positive 10 seconds; C_1, low fork, short 67 seconds; C_4, high fork, short 7 seconds; Air, short 20 seconds.

With noise producer in left ear and speaking tube in right, loudest conversational voice is heard 50 per cent. Ordinary conversational voice not heard. With noise producer in right ear and speaking tube in left, low conversational voice 100 per cent.

Spontaneous Nystagmus: Rotary nystagmus to right when looking to the extreme right. Rotary nystagmus to the left when looking to extreme left. However, the nystagmus to right is considerably more pronounced than nystagmus to the left. Very slight spontaneous nystagmus to right when looking straight ahead.

Galvanic Labyrinthine Test—Right Ear: With 2½ ma. Kathodal current the existing rotary nystagmus to the right was increased. With 5 ma. Anodal current a rotary nystagmus to the left was produced. *Left Ear:* With 4 ma. Kathodal current a rotary nystagmus to the left was produced. With 2 ma. Anodal current the existing rotary nystagmus to the right was increased.

Turning Test—Head Erect: After ten turns to the left there was produced a horizontal after turning nystagmus to the right lasting 33 seconds. After ten turns to the right, there was produced a horizontal after turning nystagmus to the left lasting 27 seconds. *Head Forward 90°:* After ten turns to the left a rotary after turning nystagmus to the right was produced lasting 27 seconds. After ten turns to the right a rotary after turning nystagmus to the left was produced lasting 22 seconds.

Sept. 27, 1924; Additional History: Patient's dizziness becomes more pronounced when he moves his head. More dizziness when eyes are closed than when eyes are opened. Also at night in bed when the lights are out complains of being dizzy. Can hear better when lying down.

Sept. 29, 1924; Caloric Reactions: Head erect, cold water in right ear produces rotary nystagmus to left side which continued for a few

minutes after stopping the flow of water. Patient's head was placed in horizontal plane, left side of head on top of table; in this position the rotary nystagmus to the left is changed to a horizontal nystagmus to the right (normal). Same findings when syringing left ear, but rather more pronounced on left side and patient spoke of being more dizzy.

Otoscopic Examination A. D.: General narrow vertically, but within normal limits. Membrane intact, brilliant, fairly opaque. Slightly retracted. By Politzer inflation there is free mobility posterior half and the rest slower, but within normal limits. *A. S.:* Membrane intact, brilliant, moderately opaque, but less than right side. Fairly normal mobility with Siegel. With Politzer inflation memberane came out over good sized area and returned.

Oct. 1, 1924: Additional History and Final Examination: Patient states he has had head noises which have never stopped since trouble began; like a high pitched hissing sound. They started after firing off a pistol fifty years ago. Patient says he has had catarrh since he was a lad. Hearing had been impaired in left ear before the above mentioned pistol shot.

Functional Hearing Test—Right Ear: Weber not lateralized, short 12 seconds; Schwabach, short 10 seconds; short 5 seconds. Rinne, not made; no air conduction. Air not heard. C_1, low fork, not heard; C_4, high fork, not heard. *Left Ear:* Schwabach, short 12 seconds; short 12 seconds. Rinne, plus-minus. Air, short 35 seconds, short 36 seconds. C_1, low fork, fairly short. C_4, high fork, quite short, short 18 seconds

With noise producer in left ear and 2 m. speaking tube in right, patient was unable to repeat loud conversational voice. With the speaking tube in left ear and noise producer in right, patient was able to repeat ordinary conversational voice, spoken 40 c.m. from mouth of tube.

Spontaneous Nystagmus: Very slight rotary nystagmus to right when looking to extreme right and to left when looking to the extreme left, but to neither side more marked than to the other. Very slight (less than 1 m.m.) at the equator, rotary nystagmus to right when looking straight ahead. *Head Erect:* After ten turns to the left a horizontal after turning nystagmus to the right was produced lasting 35 seconds; after ten turns to the right a horizontal after turning nystagmus to the left was produced lasting 28½ seconds.

Galvanic Labyrinthine Test—Right Ear: With 2 ma. Kathodal current the existing rotary nystagmus to the right was increased. With 4 ma. Anodal current the existing rotary nystagmus to the right was neutralized and swung to the opposite side. *Left Ear:*

With 4 ma. Kathodal current the existing rotary nystagmus to the right was neutralized and swung to the left. With 2 ma. Anodal current the existing rotary nystagmus to the right was increased.

Eyes—Preliminary Examination: Eyes move well and together in all directions without diplopia. Red cover test reveals no paresis of any of the extra ocular muscles. Convergence good. Stationary under cover for distance and for near. Tension normal O. U. Lacrimal apparatus normal. Ocular and palpebral conjunctiva slightly congested, no secretion. Complete arcus senilis O. U., otherwise cornea transparent and brilliant. Anterior chamber normal depth. Irides light blue, normal texture. Pupils round, black, equal in size, react promptly to light, accommodation and convergence and consensually.

Ophthalmoscopic Examination—O. U.: Media clear. *Indirect O. D.:* Disc quite round, sharply defined. Medium large, well defined cup extending to temporal edge. Suggestion of sclerol crescent temporal edge. Lamina cribosa discernible. Few scattered Drusen upper nasal equatoral region. Size and distribution of vessels normal. Fundus including the macular region normal, except for Drusen. *Direct* examination, same findings. *Indirect O. S.:* Disc elongated, axis 90,° sharply defined. Suggestion of crescents downward and outward. Large, fairly deep, well defined cup. Few small straw colored spots in macular region. Size and distribution of vessels normal. Fundus including the macular region normal. *Direct* examination, same findings.

Tension—Sept. 29, 1924: O. D. 7½ grm. weight—6 m.m. (21½ Hg); O. S. 7½ grm. weight—6 m.m.(21½ Hg).

Comments: This patient's dizziness is due to an irritative lesion (neuritis) of the right vestibular nerve and labyrinth. This is proven by the fact that it takes less than normal stimulation with the Kathode to increase an already existing nystagmus to the right side; and the patient's after turning nystagmus is lengthened on the both sides, but especially to the right. The functional hearing tests, particularly with the noise producer and speaking tube, revealed the fact that the right ear is completely deaf.

Neurological examination revealed no intracranial condition other than the neuritis of the eighth nerve. Radiographic examination showed the presence of advanced apical disease in several of his teeth.

The fields of vision are normal, or about normal. The binocular campimeter fields are normal. Besides, the ophthalmoscopic picture of the ocular fundi reveals a normal optic nerve. The absence of other intracranial nerve involvement together with normal functions

of the cerebellum excludes intracranial growth, plaques of degeneracy or hemorrhages. This case is thought to be due to focal infection resulting from diseased teeth.

Case No. 2. T. A., male, age 37 years, office record No. 5960. First examination, Sept. 29, 1924. The following is the history obtained from the patient together with the findings at the time of examination: Two years ago patient at times had a fullness in the right ear. This would make him dizzy. This dizziness was sufficient to cause him to lie down. Frequently he would vomit. He gives a history of injury to the right ear in 1917. (Hardly serious enough to fracture the temporal bone, judging from the patient's description of it.) Patient had his tonsils out and thought he was somewhat improved for a short time following their removal.

Nose Examination: Septum straight and flexible. After shrinking, right middle turbinate close contact goth sides. Left middle turbinate shows space both sides. Left inferior turbinate is moderately hyperplastic. There is free mobility of soft palate on phonation of the letter "E". Tenacious mucous between lateral wall and processus uncinatus on the right side. Right middle turbinate slightly puffy and red, probably the result of involvement of one or more of anterior group of ethmoid cells on the right side.

Teeth: Several teeth very much plugged. Upper left second molar gold crowned. Patient referred to Dr. J. W. Post for X-ray of teeth.

Throat: Tonsilar fossa clean. Tonsillectomy eighteen months ago.

Functional Hearing Test—Right Ear: Conversational speech, 8 m.; whispered speech, 4 m.; acumeter, 2.5 m. Schwabach, short 20 seconds. Rinne, positive 5 seconds. C_1, low fork, short 56 seconds; C_4, high fork, short 9 seconds. Air, short 37 seconds. *Left Ear:* Conversational speech, 8 m.; whispered speech, 6 m.; acumeter, 6 m. Weber lateralized to the left. Schwabach, lengthened 7 seconds; Rinne, positive 35 seconds. C_1, low fork, short 26 seconds; C_4, high fork, normal; Air, short 4 seconds.

Otoscopic Examination, A. D.: Membrane intact, brilliant, slightly retracted, slightly opaque. Hammer handle slightly narrowed pathologically. Mobility with Siegel quite normal. Politzer inflation—normal mobility and over a large area.

Otoscopic Examination, A. S.: Membrane intact, slightly dull, opaque, questionably retracted. Normal mobility with Siegel in that the hammer handle moves with the membrane. Politzer inflation—membrane came out over a large area and returned.

Spontaneous Nystagmus: No spontaneous nystagmus when looking straight ahead. When looking to extreme right there is a mixed horizontal and rotary nystagmus to right. When looking to extreme

left there is a mixed horizontal and rotary nystagmus to the left, equal to the two sides. (Physiologic.) No spontaneous nystagmus when looking straight ahead.

Galvanic Labyrinthine Test—Right Ear:* With 8½ma. Kathodal current rotary nystagmus to the right was produced. With 2½ ma. Anodal current a rotary nystagmus to the left was produced. *Left Ear:* With 6½ ma. Kathodal current very slight rotary nystagmus to the left was produced. With 6½ ma. Anodal current a slight rotary nystagmus to the right was produced.

Turning Test—Head Erect: After ten turns to the left a horizontal after-turning nystagmus to the right was produced lasting 16 seconds. After ten turns to the right a horizontal after-turning nystagmus to the left was produced lasting 20 seconds. *Head Forward 90°**:* After ten turns to the left a rotary after-turning nystagmus to the right was produced lasting 15 seconds. After ten turns to the right a rotary after-turning nystagmus to the left was produced lasting 20 seconds.

More dizziness followed turning with the head forward 90° than with head erect as occurs in all normals.

Sept. 30, 1924: Additional examination of the acoustic and non-acoustic labyrinth.

Functional Hearing Test—Right Ear: Schwabach, short 14 seconds; Rinne, positive 55 seconds. C_1, low fork, short 65 seconds; C_4, high fork, short 7 seconds; air, short 34 seconds. *Left Ear:* Weber lateralized to the left. Schwabach, normal. Rinne, positive 67 seconds. C_1, low fork, normal; C_4, high fork, normal; air, normal. (Variability of functional findings on different days is characteristic of neurolabyrinthitis of focal infection origin.)

When C_1 (64 DV) is heard on the right, patient describes it as of a higher tone than when heard on the left.

Galvanic Labyrinthine Test—Right Ear: With 7-9 ma. Kathodal current a rotary nystagmus to the right was produced (slight). With 3 ma. Anodal current a rotary nystagmus to the left was produced. *Left Ear:* With 4 ma. Kathodal current a rotary nystagmus to the left was produced. With 7-9 Anodal current a rotary nystagmus to the right was produced.

Galvanic findings on two different days practically the same and characteristic of right vestibular nerve involvement.

Minimal amount (2s. x 1 m.m.) nystagmus to right when looking to extreme right. Same to left when looking to extreme left. Both

*Very fine reaction which was not increased when using current strength up to 10 ma.

**First few jerks of the nystagmus were wide, these changed to very fine type of rotary nystagmus.

sides equal (Physiologic). Perhaps this physiological nystagmus is a trifle less than average normal.

No spontaneous nystagmus when looking straight ahead.

Turning Test—Head Erect: After ten turns to the left a horizontal after-turning nystagmus to the right was produced lasting 14 seconds. After ten turns to the right a horizontal after-turning nystagmus to the left was produced lasting 20 seconds (slightly more dizziness on left). *Head Forward 90°:* After ten turns to the left a rotary after-turning nystagmus to the right was produced lasting 15 seconds. After ten turns to the right a rotary after-turning nystagmus to the left was produced lasting 20 seconds.

Patient had eyes examined in 1917, but has never worn glasses. Vision, O. D. 6/6; O. S. 6/6.

Red cover glass test for the study of the action of the ocular muscles gives normal findings, *i. e.*, no extra ocular paresis.

Muscle test with Maddox Rod before O. D. reveals no vertical or horizontal muscle imbalance.

Remarks: This patient has aural vertigo from the description which he gives and the findings gathered. This combination together with the absence of paresis of any of the extra ocular muscles (which might produce a vertigo somewhat similar to the one he complains of) proves the case. The electrical reactions and after-turning nystagmus balance well, showing that the vestibular branch of the eighth nerve on the right side is involved. In the attempt to be accurate both the electrical and turning tests were repeated. Daily variations in reactions is quite possible in cases of this kind. The worse the patient's condition the greater Kathodal stimulation is necessary to produce a nystagmus to the right and the shorter will be his after-turning nystagmus, to the right. Also the shorter bone conduction together with the Weber to the left side shows perceptive apparatus deafness of the right side. In other words, both branches of the eighth nerve are involved. In unilateral involvement of the eighth nerve the first thing that is thought of by way of etiology is a focal infection. The patient's tonsilar fossae are clean and from the records there appears to be no focus of infection in any other part of his body, so the next logical place to look for it is about the teeth. The X-ray examination of the teeth puts the location of the patient's trouble there. It is believed the removal of the offending teeth, together with the surgical cleaning up of the sockets will bring about a prompt relief of the patient's eighth nerve, neuritis on the right side and possibly a partial restoration of some hearing.

1724 Spruce Street.

A CASE OF "TONSILLAR" FISTULA.

Dr. J. B. H. Waring, Blanchester, Ohio.

Mrs. I. M. S., aged 39 years, married; came to my office with request that I "clean out a tube in her throat" that was bothering her.

She gave a general medical history of diphtheria in infancy; scarlet fever at 10 years of age; otherwise negative. Menstruation established at 14, and married at 20 years; on child was born eleven months after marriage; with two miscarriages after that. Says she had "peritonitis" fifteen years ago. At one time before this, says she did not menstruate for ten months, and supposed herself again pregnant. The abdominal enlargement, however, proved to be a phantom tumor, which lasted four or five months; this subsided suddently, with copious passage of gas by mouth and by rectum, so patient thinks this "phantom tumor" must have been a "gas tumor".

The left breast was removed about five years ago by a general surgeon, for what he told her was a tumor growth that would turn into cancer, in that breast. No recurrence to date. Also says she had some sort of a bloody tumor removed from her womb, which her doctor said was filled with "coffee grounds".

Is a large, well-developed woman, weighing about 150 pounds; and aside from incidents mentioned, says she has had good health most of the time. Menstruation has been regular for a number of years now, and no complaint referable to female organs. Is moderately constipated and inclined to over-eat.

Patient says she first noticed the trouble with her throat when about 15 years of age; at that time it was the style amongst her young girl acquaintances to wear a wide ribbon around the neck like a high collar; at times she noticed a spot on these ribbon collars, but paid little attention to it, as she had no pain or discomfort referable to the neck. At 17 she noticed at times a definite seepage of a thin watery fluid from time to time, coming from a small opening in the skin of her neck about a half inch above the clavicle, and slightly to the left of the midline of neck. The condition gradually became more noticeable, and in addition to the seepage from the neck opening, the side of her neck began to puff up at times and cause her pain and discomfort. Massaging of this swelling would usually relieve the pain, with discharge of a bad-tasting, offensive discharge into the throat, which she would spit up.

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Patient says she has seen many doctors, including throat specialists; says one prominent throat specialist commented that it was a "hospital case" but did not offer to operate. Another throat specialist of lesser repute, put some sort of an electric wire down the tube in her throat, to "burn it out;" but this was ineffectual, merely resulting in considerable swelling and severe pain for a number of days. Since then she has contented herself with visits to a doctor's office, whenever the neck began to swell and bother her, to have the tube in her throat "cleaned out" by swabbing and massage.

Examination of the nose, throat and ears was negative insofar as any definite pathologic lesion was apparent on inspection. The tonsils were small, rather ragged, and the seat of a chronic follicular tonsillitis; pillars were not adherent. Guided by patient's directions, however, a small blunt-pointed probe carried into the left supratonsillar fossa slipped in a fistulous tract back of the tonsil and just anterior to posterior pillar; followed down with careful probing, the fistulous tract led down the neck along the anterior border of the left sterno-mastoid muscle, to open through the skin at a point one-half inch above the clavicle and just external to the midline of neck. The skin immediately about the pinhead external opening of the fistula was brown pigmented, like a large freckle; and it was only after milking down the tract that a bead of thin, watery secretion could be expressed. Patient said the "tube" was usually cleaned out with cotton applicators dipped in peroxid.

Application of a tonsil suction tube to the left tonsil brought up a considerable amount of decomposed food debris and mucus; following this a fine silver cannula was carried down the tract and suction applied, with evacuation of a small quantity of brownish red glairy mucus.

Patient was advised to have tonsils removed; and then if the trouble persisted, to have the fistulous tract dissected out through skin incision. Operation was refused, however, patient being content to have the "tube in her throat cleaned out" from time to time, as this became necessary.

109 East Main Street.

BRONCHOSCOPY AND ESOPHAGOSCOPY IN EVERY DAY PRACTICE AND SOME POINTS OF SPECIAL IMPORTANCE TO THE BEGINNER.

Dr. A. J. Shekter, Jamaica, N. Y.

Knowing full well that many more interesting cases have been reported, it is my object in presenting the following ten cases to merely emphasize the importance of endoscopy in every-day practice and to bring out some points at times overlooked in doing this work.

Case 1: E. H., age 5 years, male, referred to me by Dr. D., of Northport, for laryngeal examination. Mother gives history that, for the last two years the child has been continually subject to cough and hoarseness; that he had been treated for bronchitis off and on, given the usual family cough mixtures with no results. On direct examination, at the Huntington Hospital, multiple papillomata were seen springing from the interarytenoid tissues and the posterior part of the right cord. These masses were removed with forceps, the base cauterized. The patient got along fairly well, picked up in weight, cough disappeared, hoarseness improved, only to again recur in about six months. Repeated removals have been resorted to, various cauterizing methods tried, but still find this growth very obstinate in children. I would appreciate any suggestion as to the successful treatment of such cases.

Case 2: I. F., male, age 28 years, salesman. Chief complaint, hoarseness. Because of this was treated by the family physician with the usual sprays and medicants. The patient was referred to me by Dr. G. By direct laryngeal examination, at the Huntington Hospital, found a large single papilloma springing from the anterior commissure. This was readily removed and base cauterized. Hoarseness disappeared and voice remained perfectly normal since, which is about two years from date of removal. Re-examination showed no sign of recurrence of growth. Laryngeal papillomas in the adult when removed is less apt to recur than in children.

Case 3: Frances M., female, age 10 years, referred to me by Dr. D'U., of the Jamaica Hospital. History: While keeping an 1830 penny (a little larger than the size of a quarter) in her mouth, suddenly swallowed it. Thirty-six hours later began to vomit and

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complain of something in her throat. An X-ray and direct esophageal examination revealed the coin lying in the esophagus just below the cricopharyngeus muscle. The coin was readily removed. Note: Flat objects in the esophagus just below the cricopharyngeus is very apt to be passed over, especially where it is covered by the plicacricopharyngeus and tactile appreciation of contact lost after the tip of the tube has passed over the foreign body (Plate 1).

Case 4: Baby P., age 4 years, swallowed a quarter; four days prior to admission to the Jamaica Hospital. She had no symptoms

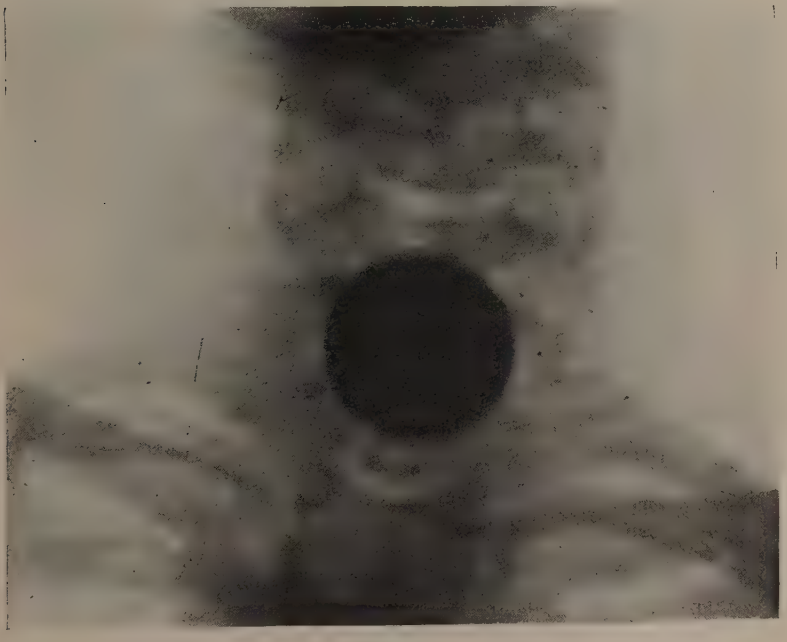

Fig. 1.

till the day of admission, then began to vomit. X-ray and direct esophageal examination revealed the coin in the same position as in Case 3. The coin was very readily removed (Plate 2).

Case 5: Mrs. W., age 40 years; came to the office saying she had swallowed a piece of bone mixed in some mashed potatoes, one day ago, and complained of a sensation of pressure and pain over the sternum. X-ray showed no foreign body in the esophagus or trachea. Direct esophageal examination, however, revealed an ulceration on the posterior wall of the esophagus at about the level of

the bifurcation of the trachea. This was touched up with a 25 per cent solution of argyrol and the patient sent home. The next day the patient passed the piece of bone shown in Plate 3. Note: Sensation of pain or foreign body may persist even after removal or passage of the object and is very often associated with ulceration; this happened also in the following case.

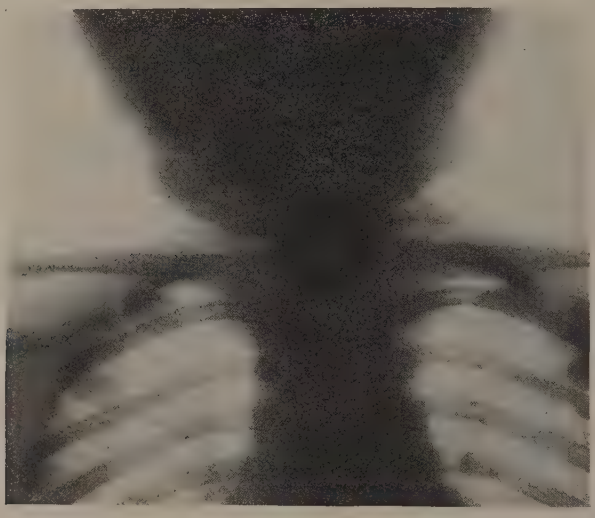

Fig. 2.

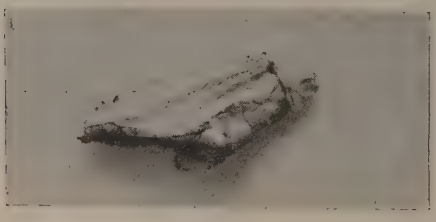

Fig. 3.

Case 6: Mrs. R., age 46 years. While drinking milk from a glass pitcher, suddenly felt that she had swallowed pieces of glass. She began to vomit and immediately went to her family doctor, who, she says, removed several pieces of glass from the back of her throat and that a little later, on coughing, expelled another small piece of glass. She still complained of something sticking in her throat. X-ray did not reveal the presence of a foreign body. Direct examination, however, revealed a slightly edematous cricopharyngeus

with a small ulceration posteriorly. Probing revealed nothing. Ulcerated area touched up with a 25 per cent solution of argyrol. The sensation of foreign body disappeared in a few days.

Fig. 4.

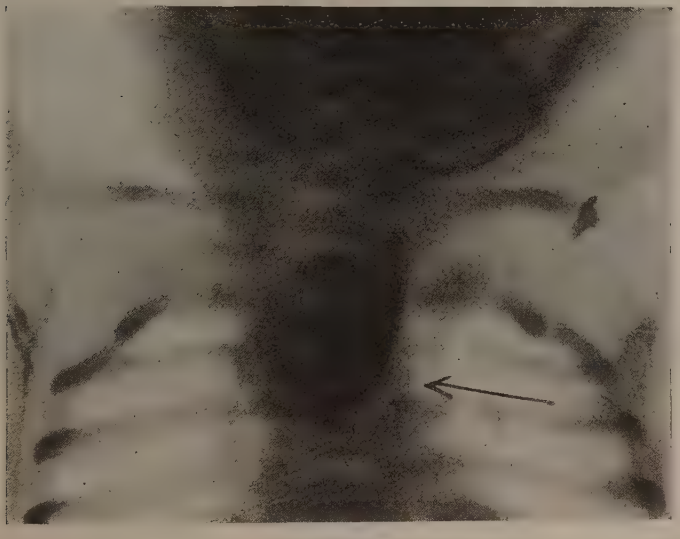

Fig. 5.

Case 7: Dorothy T., age 18 months. Referred to me by Dr. V., of the Jamaica Hospital. History: Mother believed baby swallowed a safety pin and becoming alarmed brought the child to the

doctor. Here the baby was fluroscoped and a large size safety pin, closed, was seen in what appeared to be in the esophagus. I was called rather late in the evening to remove the pin at the doctor's office, which I proceeded to do, but after several attempts trying to find the pin, even with the use of the fluroscope as a guide, gave it

Fig. 6.

up and advised that the child be sent to the Jamaica Hospital where it could be X-rayed after a bismuth meal. This was done; the X-ray showed the pin pointing towards the right bronchus. The pin was then readily removed. The interesting thing about this case is that the child at no time showed any irritative symptoms leading towards the trachea or bronchi (Plate 4).

Case 8: Baby O'G., age 4 days, born at the Jamaica Hospital, was unable to retain any of the feedings for more than a few minutes. Believing that there may be some obstruction due to pressure of an enlarged thymus, the infant was X-rayed after a bismuth feeding. The picture showed bismuth in the upper third of the esophagus, but none below. On direct examination I found the upper third of

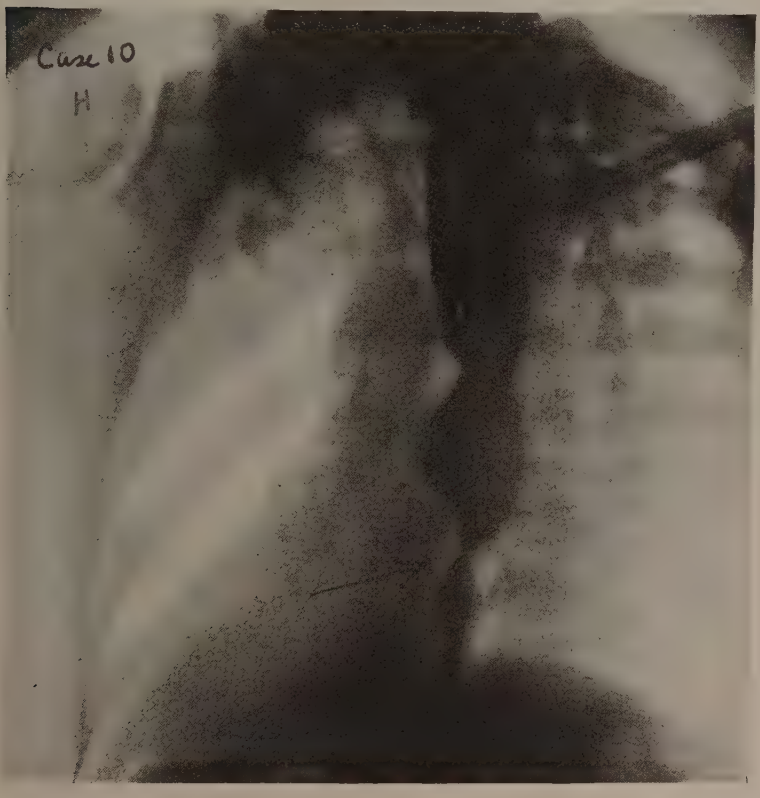

Fig. 7.

the esophagus to be much dilated and ended in a blind pouch. An autopsy performed four days later confirmed my findings. There was just a fine thread-like band extending from this blind pouch through the diaphragm to the stomach (Plate 5).

Case 9: Mr. R. S., age 40 years, referred to me by Dr. P. Patient gives a history of a progressive difficulty of swallowing foods,

first solids, then semi-solids and now even liquids. That he has lost about 50 pounds in the last six months. Bismuth meal and X-ray revealed an irregular constriction in the esophagus at about the lower third. On direct examination, at the Huntington Hospital, found constriction with infiltrated esophageal walls at the point shown in the X-ray. A diagnosis of malignancy of the esophagus was made (Plate 6).

Case 10: Mr. H., age 58 years. Admitted to the Jamaica Hospital, chief complaint being difficulty in swallowing, with a history about the same as in Case 9. The X-ray after a bismuth meal showed a marked constriction of the esophagus in its lower third with dilatation above. Direct esophageal examination showed marked infiltration of the esophageal walls at that point, with free bleeding during manipulation. A diagnosis of malignancy of the esophagus was made (Plate 7).

The points I wish to emphasize in presenting these cases is that laryngeal papillomata in the adult respond to treatment much more readily than in children; that pain or sensation of a foreign body in the esophagus may persist even after removal or passage of the foreign body and may be due to an abrasion of the wall; that flat objects, such as coins, buttons, etc., may be readily passed over, especially when they lie immediately below the cricopharyngeus; that when passing an esophagoscope in an infant, for obstruction, one should bear in mind the possibility of a congenital blind pouch, and that, lastly, nonobstructive foreign bodies in the trachea or bronchi do not always give irritative symptoms leading one to suspect their presence in those areas.

150-01 88 Avenue.

NASAL TAMPON TREATMENT OF SINUS DISEASES.*

Dr. J. Ivimey Dowling, Albany, N. Y.

The Gorgas idea has for its purpose the eradicating of disease and promotion of health. It may therefore rightfully be said that the subject of my address tonight meets up with that worthy object, for any method of treatment of the nose or accessory sinuses that will fortify these tissues against invasion of bacteria will go a long way to prevent disease and eliminate disease of varied nature that may already be present.

The development of the specialty, rhinology has passed through varied phases from poor and incomplete surgery to radical and too extensive surgery. Both methods have proven faulty and the results less successful than had been anticipated. For this reason there has gradually been evolved a group which has been endeavoring to develop some method of treatment which would not only cure many of the formerly incurable conditions but also promote the beneficial effects of surgery after it has been performed. The usual sweet scented sprays, irrigation, and nebulizing oils are a comfort to patients, but are only successful in cases in which there is little established pathology.

During an experience of some twenty-five years in the active practice of this specialty it has been the good fortune of the writer to develop a method of treatment that will not only quickly cure many of the acute sinus conditions, but is also applicable to the chronic states. Terry was the first to apply the term "Dowling method" to this measure which may be used for practical sterilization before operation, and also to enhance the benefits subsequent to operation.

The method to be described provides drainage and ventilation to the sinuses, improves the tone of the mucous membrane and subjacent erectile tissues, and makes possible the avoidance of a large per cent of the operative procedures within the nose or upon the sinuses.

Through its use it is also possible oftimes to avoid the radical procedures as the Killian and Denker operations. However, radical procedures of major nature when absolutely essential may, there-

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fore, be divided into two steps, lessening the danger from the operation, and rendering more likely a successful outcome after completing all the operative procedures which may have been required.

The first duty of the physician is to heal the sick and a good surgeon is even a better surgeon if he can eliminate a certain proportion of cases from the need of surgical procedure, providing equally good or better results can be obtained through less radical measures.

The experience of years permits the writer to make the absolute statement that his method of treatment, which has been given the name of Dowling method will cure a major number of the simple sinus conditions and a goodly proportion of the more difficult cases which have hitherto proven resistant not alone to treatment, but also to the usual surgery instituted.

The method to be described may be applied to the young child and to the aged adult with every expectancy of benefit. This opens to the specialist a very much broader sphere of usefulness, in that children during the period of development may be beneficially treated until such time as required operative procedures may be conducted with the best likelihood of success.

The casual person may say, "if a case is operative or appears likely to become operative, why not perform the operation at once even though at an early age"? It seems reasonable to believe that the good conformation of the face will be better accomplished if the parts are kept healthy and left to develop naturally than if bone elements, which are very necessary to mature development, are removed at too early an age.

Surgery upon the bony parts in a young child should be avoided except as a last resort and so a method which definitely accomplishes ventilation and drainage of the sinuses is well worth a fair trial by those interested.

The best health of the sinuses is possible only through free drainage and good ventilation and these may be attained through the Dowling method of treatment.

Healthy membranes heal more readily than those saturated with pathogenic organisms and so it only needs a little experience until a surgeon will employ this method before operating, and later after operation make use of it as a valuable aid in promoting the health of the membranes and the erectile tissues and thereby make them resistant to future infections.

Killian has reported operating upon a frontal sinus at the age of one year and three months, but this is a very rare need, although Davis in his recent work on the development of sinuses in children

has shown that sinuses may be present in size at almost any time, even before the age of seven years, this being the age after which the frontal sinus becomes most often a surgical possibility. The sphenoids develop but slowly and up to the age of seven are rarely to be considered as a surgical possibility and yet they become infected. Even though small in size they may become sources of trouble and in light of our known knowledge of focal infection may require drainage.

The difficulty of relieving any sphenoid disease at an early age through operation makes more necessary a knowledge of some better method for providing drainage for these cavities through the period of development.

All specialists are familiar with empyema of the maxillary sinus in the adult and approach treatment with considerable confidence, in that they can make an exploratory puncture beneath the scroll of the inferior turbinate and through irrigation secure results that are often times startling in their efficacy, but what of the young child in whom the sinuses are not fully developed? Here we have to consider the germs of the second teeth, which may readily be damaged because of some disease which has gained access to the maxillary sinus during its period of development and also the superficial relation of the dental nerves as they pass through this cavity and which become frequently irritated during the period before the second dentition, thereby occasioning referred nervous types of disease, such as phlyctenular ulceration of the cornea. These referred diseases are very resistant to treatment but are very materially benefitted through the use of the author's method of treating the sinuses.

This method of treatment renders unnecessary any exploratory puncture of the maxillary sinus in children except in the very rarest instances, in which there is a sizable cavity occupied by a various pathology necessitating even some more radical procedure than an exploratory puncture. The floor of this sinus is high in a child during its development and therefore the puncture must naturally be above the scroll of the inferior turbinate body, which will place it somewhere in the vicinity of the natural ostium through which the maxillary sinus normally drains and ventilates.

The ethmoid cells are possible sources of focal infection and are overlooked by many physicians and surgeons, and yet we know that these cells are numerous and readily recognized at time of birth as small pounches poorly drained and yet adjacent to the portal of entry of much infection through the nose.

Many adenoid and tonsil operations have seemingly been of less benefit than had been hoped, but the full benefits to be desired readily accrue after a course of treatment by tampon method for these tampons deplete the tissues and permit the carrying of the silver colloid to the parts which are important to reach.

Argyrol and other silver colloid solutions applied by means of tampons seem to precipitate the pus in the tissues so that it may be extracted by the induced attraction and affinity of one colloid for another, for instance pus is colloid and the silver solution is colloid.

Nasal tampons of silver colloids also induce a watery precipitation from the mucous membrane, thereby practically depleting the tissues of watery elements and by the induced flooding the bacterial organisms seem to be withdrawn from the tissues. The resident infecting organisms are thereby weakened by repeated argyrol tampon treatments and the virility of successive colonies of organisms is surely overcome until there is no longer further propagation of the pathogenic organisms.

Clinically this may be observed in the free pus ofttimes adherent to the tampons at the early treatments which is later followed by a ropy jelly of translucent kind, then later by ropy jelly of argyrol color and finally the tampons may be placed and left in situ almost indefinitely without irritation locally or subjective annoyance of any kind.

These observations may be practically interpreted and indicate the activity and progress of the disease associated with pus formation.

So long as the white or yellow stringy ropes of pus are to be observed virile infection is present. With the advent of clear transulent stringy ropes virile infection is largely overcome and immunization is in the process of being acquired. The presence of dark colored mucous strings or ropes indicate that the bacterial virulence is overcome and then there remains only an over-activity of the mucous glands or a noninfected catarrhal process, which through continued treatment may be reduced to a minimum. Under this treatment the erectile tissues are reduced in size and the mucous membranes become firm and resistant to infection. The lining of the accessory nasal sinuses is likewise affected and normal ventilation and drainage of the cavities established through the natural ostia.

The difficulties of applying remedies to the various groups of accessory nasal sinuses is generally recognized, and it was not until the development of colloidal preparations that any really successful method could be established, for the ordinary aqueous solutions were not satisfactory.

The advantages of the colloidal preparations are many, but one of the chief is that they are usually nonirritating, although possessed of many virtues.

It has been determined that colloidal preparations are solutions of ordinarily insoluble substance rendered soluble by an extreme subdivision. That is, all particles are smaller than 1/250,000 of an inch. Cobb stated that the actual minuteness of colloidal particles may be illustrated by the fact that approximately one million of them could be put into the space occupied by one red blood corpuscle or ten thousand into one gonococcus, were they hollow spheres.

It does thus seem that the silver preparations in colloidal form are in the best arrangement for deep absorption into the tissues, but since it is well known that diffusion of any colloid is a slow process, it is necessary to employ some method by which argyrol or other colloids may be kept in contact with the mucous linings of the nasal chambers for a long period of time, thus providing a means through which argyrol or other colloids may be taken by vascular supply and carried to the distant organs. The Dowling method provides a satisfactory way of applying these colloids to the various sinuses by indirect method, one which is most efficacious.

After a trial of many solutions varying in per cent, it was found that the 10 per cent solution of argyrol is the best in strength to accomplish the most successful results in treatment by the method known as the Dowling treatment.

DESCRIPTION OF METHOD.

The tampons to be used are made from sterilized long fiber cotton wound about a long, thin wire-like applicator. This particular style of applicator and kind of cotton are essential in order that a long tampon may be properly placed by the gentle withdrawing of the applicator.

To make the tampon the necessary quantity of cotton should be flattened and stretched to the required thickness and length, then the probe should be taken in the right hand and the cotton held on the flat of the left hand. The applicator is then placed upon the middle of the cotton, which is then folded toward the body and over the wire and held in place with the thumb. The probe is then turned from left to right, or away from the body. The tampon having been wound upon the applicator, it should then be moistened to saturation by immersion in a 10 per cent solution of argyrol. The average quantity that each tampon will hold is from thirty drops to one dram. The next procedure is to introduce the cotton tampon

into the naris, above the scroll of the middle turbinated body, first giving it the *sphenoid direction*, pushing it as far back as possible between the middle turbinated body and septum. After the tampon is properly placed, the wire is slowly withdrawn by giving it a twist from right to left and at the same time giving a slight upward shove to the tampon in order to engage and hold it as high in the nose as possible. When the applicator has been sufficiently withdrawn, the handle is depressed until the wire is almost in contact with the upper lip with the tip pointing toward the infundibulum, then a final push is given in order to engage the tampon as nearly as possible in the vicinity of the infundibulum, after which the wire is finally withdrawn, leaving the tampon in its proper position. Before introducing the tampon, the nose should always be inspected in order to determine the width of the nares and the presence of any irregularities, for the tampon should be of such size as to reach from the anterior nares to the choanae posteriorly and of only such thickness as will permit a snug fit without undue discomfort.

The tampons should always be placed in both nostrils, for while one side may be more involved than the other, it is seldom that one side alone is affected, although symptoms may only be referred to but a single side. It is necessary to leave the tampon in place from ten minutes to an hour.

The use of cocain before placing the tampons is seldom required and should be avoided if possible, as best results are obtained without its preliminary use.

It is only necessary to use a single tampon in either nostril and in placing them there are two directions quite essential in order to locate them properly within the nasal chambers. The first direction I have termed the *sphenoid direction* and the second direction is the *infundibulum direction.* An understanding of these two directions is essential to the proper placing of the tampons. The first is the primary direction employed and the second is the final step in the operation.

The first step can usually only be approximated because the middle turbinated body is generally too large to permit the placing of a tampon direct to the ostium of the sphenoid. The second step can generally be accomplished, and I have found it the absolute sine qua non in the placing of the tampons in order to achieve full success.

The technique to be followed after withdrawing the tampon is thoroughly flushing the nares and cleansing them of all secretions. No nebulizing oil is employed and the irrigating fluid is used at the temperature of room. The use of cool irrigation after employing

tampon treatment has been found to be most satisfactory, in that the climate of Albany during the winter months the use of warm irrigation was found to be frequently followed by disagreeable after-reactions because of the relaxed state of the mucous membranes and erectile tissues. The cool solutions seem to exhibit a tonic effect upon the nasal tissues and promote the usefulness of the tampon treatment. In some cases irrigation is contraindicated, this being especially true in women at or about the time of the menses.

Indications. Treatment by nasal tampons saturated in argyrol (colloidal silver) solution is indicated in acute or chronic disease of the nasal accessory sinuses. Accepted as a fact, this affords a wide sphere of usefulness for the treatment as may readily be appreciated when consideration is given to the fact that acute or chronic sinus disease is a frequent complication of many diseases of the eyes, diseases of the ears, such as may involve the Eustachian tubes, middle ears or mastoid cells. All forms of deafness permit of more successful result, if, whatever method is being employed, there is at the same time additional treatment by the Dowling method directed to the nasal sinuses.

Effects. The results obtained through this treatment are immediate and remote, pleasant and disagreeable, and are also of subjective and objective kind. The immediate effects are suffusion of the conjunctiva, lachrymation, an increase of an already existing conjunctival congestion, sneezing and flow of mucus from the nose. Intraocular and tympanic congestions are lessened and visual acuity may be rendered more acute. Tinnitus is frequently lessened or controlled for a time.

That actual drainage of the sinuses is accomplished is well demonstrated in occasional cases of acute nature in which the maxillary sinuses are sufficiently filled with pus to overcome the light reflexes incident to transillumination, *for subsequent to treatment these sinuses will actually show a positive degree of illumination.* Of course, in chronic cases which have progressed to actual empyema, no such effect is noted, for the reason that the mucous linings are too greatly thickened to permit transmission of light rays until after many treatments, or operation has been instituted.

Another most satisfactory immediate effect is the lessening of radiating pains which may have involved the ciliary nerves or various branches of the trigeminus. Headaches which are described as frontal, vertical, occipital or of the entire cranium, are frequently promptly benefitted after one or more treatments.

The disagreeable effects are occasionally most positive and may be noted as a decided turgescence of the erectile tissues of the nose, increase of pains, vertigo and nystagmus. I have seen these last two symptoms of such severe nature that the patient would be unable to walk without aid, and indeed would fall if left unsupported. These aggravations are not greatly lessened by the use of cocain, but must pass off gradually, and seem to yield most satisfactorily to rest alone.

Frequency of Treatments. The frequency of treatments is governed entirely by the length of time the induced effects persist, and daily treatments may be necessary and again treatments should be but once a week or even less often.

Continuance of Treatments. A single treatment is often sufficient for the cure of acute head colds, while for the more chronic conditions of the eyes or sinuses, the treatment may be necessary over a period of months or even for several years. The length of time that these treatments may be continued is but evidence of their virtue, for many heretofore progressive diseases of the eyes are rendered sationary while the method of treatment is continued.

Diseases of the eyes or sinuses that are benefitted but not cured through this treatment will often respond to operative interference, after which further use of argyrol tampons will establish a satisfactory result.

Value as diagnostic aid for infection and indication for operation. The laboratory researches of Dr. Charles E. Terry, of Jacksonville, Florida (published in the Transactions of the Florida Medical Association for the year 1909) indicate the value of argyrol tampons as an aid in diagnosing hidden infections of either acute or chronic nature for in the presence of pathogenic organisms there is a distinct bleaching of the tampon which will change from its normal dark brown color to a yellowish tinge or even be fully decolorized. This fact is of importance in determining the advisability of operating upon the ethmoid region or sphenoid sinuses. In the event of progressive disease of the optic nerves or other ocular diseases, in which radiographs seem to indicate normal sinuses, though the pictures show clear, large sinuses, there may yet be sufficient residual infection to influence the progress of ocular diseases; the membranes being infected to the point of saturation, with resulting ostitis of proximate parts. This condition I have observed in a sufficient number of cases to lead me to state it as a possible cause for some otherwise inexplicable ocular diseases of progressive nature, and in lieu of "idiopathic cause", such origin should be con-

sidered in the presence of positive bleaching of the tampons. *Furthermore, a positive reaction obtained in progressive diseases should suggest the advisability of operation, providing some improvement is observed through the use of tampons employed as a therapeutic measure, and this despite the negative result of the radiographs.*

A satisfactory nomenclature has been devised whereby the argyrol tampon may be readily interpreted as a diagnostic aid, making it easy to determine progressive improvement in any given case through successive treatments. It also permits an intelligent report from one doctor to another and an interpretation by the second doctor of the first one's findings.

The following has been adopted in my own practice and is suggested for general adoption.

ARGYROL TAMPON REACTION.

Plus—1 Simple decoloration of tampon.

Plus—2 Simple decoloration of tampon, sneezing, and jelly mucus on irrigation.

Plus—3 Simple decoloration of tampon, sneezing, ocular suffusion and jelly mucus on irrigation.

Plus—4 Simple decoloration of tampon, sneezing, ocular suffusion with chemosis, jelly mucus on irrigation, and ropy discharge oftimes adherent to posterior end of tampon.

Plus—5 Simple decoloration of tampon, sneezing, ocular suffusion with chemosis, jelly mucus on irrigation, and ropy discharge oftimes adherent to posterior end of tampon, and aural reaction (vertigo).

Illustrative Case Records. Analysis of one hundred acute cases of head cold recently treated shows disappearance of symptoms after one or two treatments in 60 per cent of the cases. The remaining 40 per cent exhibited intranasal pathology obstructing drainage and ventilation to the sinuses, which naturally necessitated treatment over a longer period of time. Were it possible to treat all head colds by this method in their incipiency I feel warranted in stating that cure could be obtained in a very much larger percentage of cases. The only cases that would not yield quickly would be those presenting some surgical pathology.

I am glad to include reports from the records of my associates, Dr. A. C. Worth, Dr. Henry M. Grogan, and Dr. L. Prescott Brown. These cases merely represent a few for the purpose of illustration, but all are significant because of the benefits attained.

Dr. Worth states that, "in the treatment of acute rhinosinusitis by the Dowling method that the average cold will be relieved of all dis-

tressing symptoms within six days, but especially during the last three days. Tamponade does more than get rid of symptoms, it enhances the comfort of the patient during the first week very greatly over other treatments."

He submits the following cases:

1. "Mr. M., age 25 years, acute suppuration right ethmoid and frontal region (free pus at time flowing into infundibulum), very much pain. Condition entirely controlled by tamponade within ten days, when last seen return to normal appeared complete. (Operation refused.)

2. "Mr. H., age 45 years, subacute posterior ethmoiditis with pharyngitis (severe)—whole condition entirely relieved by one tamponade (no local pharyngeal treatment).

3. "Mr. H. W. B., age 45 years, chronic ethmoiditis bilateral (with associated ocular congestion of long standing). Condition greatly relieved and associated lesions cleared up by tamponade over a period of four weeks.

4. "Mrs. J. H. L., age 30 years, acute congestion, ethmoid and frontal regions left side with supraorbital pain (associated otitis media). Nasal distress relieved in three days by tamponade.

5. "Mr. A. B. McN., age 50 years, acute congestion in right antrum following removal of tooth. Symptoms and discharge cleared up after three tamponades.

6. "Mr. J. R., age 30 years, chronic ethmoiditis with acute congestion of all other sinuses. Discharge very abundant. Treatment with tamponade entirely effective within ten days.

7. "Mrs. L. F. G., age 65 years, persistent discharge following acute rhino-sinusitis. Entirely relieved by three tamponades over a period of ten days.

8. "Mrs. M. E., age 30 years, subacute pansinusitis with severe pharyngitis. Relieved by four tamponades over a period of ten days. (This case illustrates how effective tamponades are on pharyngitis in which we have to admit that ordinary applications are very ineffective.)

9. "Mrs. S., age 45 years, acute pansinusitis. Pain not severe but complaining bitterly of the odor. Relieved of odor almost entirely by one tamponade. Reported well on fourth day after treatment.

10. "Mr. C. W., age 50 years, chronic ethmoiditis left. Under treatment with ordinary methods for months. Entirely relieved by three tamponades over a period of ten days."

Dr. Grogan submitted three interesting cases of acute empyema of the frontal sinus, all presenting Ewing's sign, and all quickly relieved by the method under discussion.

Dr. Grogan submits the following cases:

1. "On Jan. 15, 1925, Miss J. A. G., age 64 years. One week ago severe cold in head, now has pain over her right frontal sinus in morning, after being up and around a while, aggravated by bending forward. Ewing's sign present. Transillumination right frontal sinus and right antrum clouded. Septum deflected high to right. Argyrol tampon with almost immediate relief of pain following pronounced sneezing. On removal of tampon much pus seen exuding over the anterior end of the right middle turbinate. Patient still under treatment, but has entire relief from pain.

2. "On Oct. 1, 1924, Mr. W. C. G., age 34 years, complained of pain over left eye following acute sinusitis. Ewing's sign present. Septum deflected high to left with a polypoid degeneration on the left middle turbinate with obstruction left nasal frontal duct. Treatment, argyrol tampon, much sneezing, and on removal of argyrol tampon escape of free pus from left infundibular region. Patient discharged Oct. 4 cured.

3. "On Mar. 15, 1923, Mr. W. H., age 37 years, history of severe acute sinusitis two weeks' duration with severe pain over left eye. Ewing's sign present. One hour ago had a hypodermic by his physician, Dr. Maguire, and now pain has stopped.

"Transillumination left frontal and left antrum clouded. Septum deflected high to left, left middle turbinate very much swollen and congested. Argyrol tamponade, much sneezing and on removal of tampon free pus seen escaping between left middle turbinate and external nasal wall. This treatment was repeated until Mar. 21, 1923, when all symptoms had disappeared and patient was discharged as cured."

Dr. Brown submits the following cases:

1. "Mr. W. B., Nov. 24, 1924, age 30 years, complained of pressure pain over right antrum and right eye following acute cold in head. Examination showed a straight septum with hypertrophied middle turbinates. Pus was flowing from under the right middle turbinate. Ewing's sign present on the right. Temperature 99,° and white blood count 10,000. Argyrol tamponades gave immediate relief and started a free flow of pus. No medicine was prescribed. The same treatment was given on the following days and the case discharged as cured.

2. "Mr. F. L. W., Oct. 2, 1924, age 22 years. Acute pansinusitis involving the left frontal and the left maxillary especially. Ewing's sign present on the left. Transillumination showed the left group of sinuses absolutely dark and the right with impaired illumination. Argyrol tamponades gave immediate relief and started a flow of pus from the left infundibular region. The pain was still so severe that he was sent to the hospital for observation and X-rays. X-rays showed large frontals which were cloudy as were also the maxillary antra. Patient treated by tampon daily for one week with complete disappearance of all symptoms (operation avoided)."

During the past twenty years I have accumulated considerable data as to the benefits to be attained in many eye diseases complicated by sinus infections and treated according to the Dowling method. That nasal tampon treatment of the sinuses is not more generally employed in the presence of associated eye diseases is unfortunate. It is especially useful in the various varieties of uveitis as is advised by Thorington on page 830, Vol. 2, of Modern Treatment, edited by Hare and Landis.

At the meeting of the Southern Medical Association at Jacksonville, Florida, in 1915, Dr. Wm. S. Manning reported many cases of iritis in which the treatment was shortened and cure of the disease hastened materially through the additional treatment with nasal tampons.

HEADACHES.

Quoting from Dr. Crawford R. Green, of Troy, N. Y., in a paper entitled "The Dowling Method of Nasal Tamponade in General Practice", which appeared in the *New England Medical Gazette*, August, 1916, he states concerning *headache* "among the most common of the condition to which the treatment is applicable is reflex headache, whether it have its origin in ocular disturbances or in disturbances of the sinus per se. In fact, the treatment is so beneficial in so many cases of chronic headache that it is worthy of trial even in cases where the cause is not positively known to arise from the sinuses or any of the organs of special sense. It is astounding in the light of our present knowledge, how little attention is paid to the condition of the accessary nasal sinuses. The catarrhal headaches of congestive type that are caused by the locking up of secretions in these cavities are extremely common, and, in the majority of cases, all the victims receive is palliative treatment with, too often, an erroneous diagnosis of the causative condition. Headache tablets, powders, nostrums may give temporary relief, leaving a dull

unclear sensorium behind it; the Dowling tamponade *cures* by removing the cause and leaves behind a clear sensorium and a sense of exhilaration and well being that is the result of the removal of constant irritation. *The exhilaration and ability to think clearly is a striking immediate effect of the treatment.* This result is well demonstrated by two patients who have been under the author's observation for several years. One is a lawyer, the other is the treasurer of an important manufacturing company. Both have been long sufferers from catarrhal sinusitis. Almost invariably, before undertaking any unusually important work, these men will appear with a request for tamponade because it makes their brain seem so clear and they can concentrate their minds so easily upon their problems.

"Relief from headache by this treatment is in many cases so immediate that a patient who comes to the office with severe headache frequently goes out with his head absolutely clear. The chief result, however, is that many patients who have suffered for years from severe and frequently recurring headaches are relieved altogether from having headache. To this end the treatment must naturally be persisted in for some time. The treatment must be given twice a week, once a week, or perhaps once in two weeks as conditions seem to indicate, and the persistency is well rewarded. The writer has cared for patients who have received this treatment regularly every week or two for three months, six months, a year. Formerly, they suffered from severe headaches which incapacitated them from work for a day or more every week, every two weeks or every month. They now pass month after month without a single headache, or, if they should have headache, they know where and how to receive prompt relief."

POLYPOID ETHMOIDITIS.

Before operating for nasal polyps in their incipient stage when they first begin to be present beneath the scroll of the middle turbinate and in the region of the infundibulum it is well to institute a course of treatment by argyrol tampons. Most rhinologists would be surprised to observe how readily these incipient polyps are influenced and disappear from view, affording the patient a clear head free of any gross evidence of disease.

ASTHMA.

One of the most distressing conditions from which patients suffer and which has proven most difficult for physicians to successfully combat is *asthma.* Hazeltine and LaForge offer much in evidence corroborating the author's findings that argyrol tampons play

an important part in the successful treatment of asthma. The acute paroxysm does not always yield to adrenalin or other treatment, but here again argyrol tampons will often prove a friend in need. A single case is sufficient as record.

Mrs. W. G. M., age 65 years, had suffered for some time with chronic frontal empyema and polypoid ethmoiditis. Operation was repeatedly refused. The writer was called at four o'clock in the morning and urged to hurry to the bedside of this patient because it was the belief of the nurse in charge that she was dying. I found her bolstered up in bed with all the intense agony of the asthmatic expressed by audible wheezing, gasping and reaching for breath. Adrenalin and other remedies had been employed, but without effect. I assured the patient that she would soon be all right. I made use of my method of treatment and within a half-hour the patient was recumbent on one pillow and breathing easily. She has never suffered such an attack since, the condition being kept under control by nasal tampons alone.

Concerning bronchial asthma Hazeltine has reported cases typically rhinological in which he states no surgery was instituted and the satisfactory results obtained were due to the use of nasal tampons according to the method under discussion. In an article entitled "Bronchial Asthma", by Hazeltine, which appeared in *Clinical Medicine* for August, 1924, two cases are of especial interest in the present discussion, for after failure of other treatments these asthmatics were cured through resort to the Dowling method.

One case reported by Dr. Paul Hohly, of Toledo, Ohio, is commented upon by Hazeltine as follows: "A typical 'sensitization' case reported by the patient's father, himself a physician of wide experience in the treatment of asthma. The resources of experts in 'immunization methods' were exhausted without avail. The case was easily recognized as chiefly rhinological and required only such treatment as a physician untrained in the specialty could give after a few days' instruction. Note the prompt removal of all food restrictions and the early disappearance of 'sensitization'. B. H."

A second case of rhinological type was studied and diagnosis confirmed by many physicians. Excerpting Hazeltine's report the points of present interest are "the only abnormal finding in this child was a chronic, purulent, posterior, ethmoid infection (bilateral). The only measures employed were treatment (daily at first, then with lessening frequency) of this infection by the Dowling method. Relief was apparent in two weeks, and in one month, she was sleeping normally without use of adrenalin or other palliative.

At the end of four months the child had gained fourteen pounds in weight and was entirely free from bronchospasm."

I saw this patient while on a recent visit to Chicago. She appeared perfectly well and had come out during a violent storm of snow and sleet. I asked the patient if she was not afraid to expose herself at such a time and she replied "Oh no, for I never have asthma any more". This patient has been well for five years.

CONCLUSIONS.

1. Silver colloids are of distinct value in the local treatment of both acute and chronic sinus diseases.

2. The best method of employing colloid silver preparations in the treatment of sinus disease is by means of nasal tampons according to the Dowling method.

3. Clinical experiments and observations during a period of over twenty years accords argyrol first place because of its positive remedial value in treatment and, secondly, because of its unique and positive value in determining the presence of pathogenic infections within the nasal chambers and accessory sinuses in spite of negative radiograms or other negative findings.

4. Positive Dowling reaction in the presence of symptoms unrelieved by treatment is sufficient evidence to warrant operation even though X-ray findings are negative.

5. Argyrol tampons are a valuable aid in treatment and through their use a near approach to sterility may be attained preparatory to many intranasal or sinus operations.

6. As a postoperative procedure much intranasal or sinus surgery of doubtful issue may be rendered successful.

7. Acute rhinosinusitis uncomplicated by chronic pathology are readily cured in from one to several treatments conducted over a period of from one to four or five days.

8. Chronic pathology obstructing the nasal meati and blocking the drainage and ventilation of the sinuses is so influenced by nasal tampon treatment that normal drainage and ventilation of the sinuses is obtained, thereby avoiding operation in many cases; or where surgery is a sine qua non making it possible to attain success by less radical procedures than may at first have seemed necessary. In addition an interval operation is made possible in cases of recurrent

sinus attacks making more likely successful issue in cases of this trying character.

9. *Headache.* The daily early morning headache, the vacuum headache and the "Sluder syndrome", all, so diagnostic of sinus disease are readily overcome providing the pathology is not typically of surgical nature.

10. Both the Eustachian tubes and lachrymal canals are so readily benefitted that dilation of these canals is rendered less difficult and the beneficial results more permanent.

11. *Eyes.* Many inflammatory diseases of the eyes exhibit a quicker response to treatment if the usual recognized treatment is complimented by nasal treatment of the sinuses.

12. *Asthma.* Acute asthmatic attacks may ofttimes be controlled for the time by the Dowling method of nasal tampon without the aid of other measures. The Hazeltine-LaForge treatment, than which no more successful treatment has yet been devised, for chronic bronchial asthma, includes the proper use of nasal tampons saturated in 10 per cent argyrol solution.

13. Aggravations of varied kind and great severity are possible from the use of argyrol tampons but such effect does not contraindicate their use. These unfortunate effects excited by the treatment are most apt to occur in women immediately before, during, or soon after the occurrence of the menses.

116 Washington Avenue.

THROAT STIFFNESS AND THE VOICE.

Dr. John A. Glassburg, New York.

Throat stiffness is the most common ailment that attacks the throats of professional voice-users. Though not a recognized entity, it is so prevalent and characteristic that it deserves a special category and description. This affliction, which is the basis of most if not all of the laryngeal difficulties of singers, is not really a disease per se but a symptom complex. Throat stiffness is the strain of the laryngeal muscles produced by an incorrect method of voice production. The occasional huskiness, the intermittent hoarseness, the easy fatigue, the inability to sustain long passages and the defective middle or high register are usually due to this condition.

Ordinarily, the frequent use of the voice should not tire but strengthen the laryngeal muscles. A voice used correctly can be exercised daily without strain or fatigue. In fact, the exercise of a properly placed voice, well produced, increases the volume, facility and power. Repeated attempts to increase the register and produce loud or forceful sounds, strains, stiffens and eventually weakens or destroys the voice. Bad teaching and poor voice production have spoiled many a good voice. A bad voice may not be bettered but a good voice may be ruined.

When the voice is used correctly each laryngeal muscle contracts in a normal, physiological fashion, but as soon as an extra strain is put upon the voice or the notes are taken in a false manner, an undue degree of effort is exerted by the muscles involved and stiffness results. Throat stiffness is really an occupational disease peculiar to voice users.

To obtain a clear understanding of the causation of throat stiffness it is necessary to appreciate the physiology of voice production. There are nine muscles in the larynx, the right and left thyroarytenoids, the right and left cricothyroids, the right and left lateral cricoarytenoids, the right and left posterior arytenoids, and the arytenoids. Tone is produced by the contractions of these muscles and the vibrations of the vocal cords.

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*Laryngologist, St. Joseph's Hospital; Laryngologist, New York City Children's Hospital; Surgeon, Ear, Nose and Throat, Broad Street Hospital and Stuyvesant Polyclinic.

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The posterior cricoarytenoids and the lateral cricoarytenoids have antagonistic actions, the former opening the glottis and the latter closing it and putting the vocal cords on tension. If, because of improper training, too much effort is exerted in producing the sounds the posterior cricoarytenoids are unduly contracted and the opposite acting muscles, the lateral cricoarytenoids have to overact in order to overcome this contraction. The overaction fatigues the delicate muscles and stiffness follows.

The recognition of throat stiffness, once it is firmly established, is a simple matter, for the symptoms are those of a laryngitis. The difficulty of diagnosis is in the incipiency or early stage. The first symptom at the very beginning is an inability to sing or practice for the customary period of time without fatigue. There may also be transitory huskiness. Then there is a loss in the range, a diminution in the sustenance of a note and an impairment of the pianissimo. Eventually, hoarseness sets in and the voice may be irretrievably lost. A common association is the production of either too much or too little secretion with resultant excessive phelgm or dryness.

The prognosis depends upon the time of recognition of the ailment. The earlier this is done the better the chances for recovery. The best method of determining the presence of throat stiffness is the detection of any change in the quality of the voice. An experienced singer may be able to detect her own mistakes but the ordinary voice user is usually an incompetent judge, for as a rule she cannot hear her voice as well as a discriminating listener with a trained ear.

The treatment of throat stiffness is based on physiological principles. The cause is improper use of the voice and it follows that the rational treatment should embody a protracted rest to heal up the injury and then a regime of proper methods of respiration and voice placement. Local irritants, such as tobacco, strong liquors, spices and acrid foods should be avoided. The inhalation of steaming vapors medicated with the compound tincture of benzoin is at times very soothing.

Occasionally a nodule or node is found. This is a small growth along the sharp border of the vocal cords and well exemplifies the evil effects of improper usage of the voice. In the vocal cords there are minute glands that give off a mucous secretion which acts as a lubricant. When the voice is forced, the cords are tightly squeezed together and the ducts from the mucous glands are pressed upon. When the pressure is sufficiently great, the walls of the ducts approximate and the secretion formed in the glands cannot escape. The secretion then accumulates and a tiny protuberance appears on the

cord. This is known as a soft nodule. If the accumulation of mucus persists for a long time, it finally hardens, becomes fibrous and the singer's hard node is formed.

When nodes or nodules are present the local application of astringent remedies is indicated. In extreme cases surgical removal may be necessary. The usual astringent employed is silver nitrate. Though silver is probably the most effective remedy, its use because of its irritating action is fraught with great dangers. It is of utmost importance that great prudence be exerted in the choice of the form of silver employed. Collene, a colloidal silver preparation, may be applied without fear for it has the potency of the mineral solution without any of its irritating properties.

Indirectly, nasal obstructions, infections of the accessory sinuses and catarrh of the nose predispose to throat stiffness. The discharge from the nose drips into the throat and sets up a sympathetic inflammation which hinders the normal contractions of the laryngeal muscles. Tonsils filled with cheesy deposits act in a similar manner. The treatment in these cases is removal of the offending structures and a clearing up of the sinusitis.

In operating upon voice users conservatism should be the rule. Usually when a singer or speaker presents himself he has already been the subject of too much and often injudicious treatment. In removing nasal obstructions caution should be taken not to remove too much, for this may lead to an atrophic catarrhal condition of the nasopharynx. Tonsillectomy is still a mooted question. Every case is a law unto itself and should be judged on its own merits.

Not infrequently, when throat stiffness is present, there is found an associated inflammation of the pharyngeal mucous membrane. This pharyngitis can be allayed by sprays and gargles. The usual preparations employed are of an alkalin antiseptic nature. Recently a colloidal silver solution has been developed which makes a very efficient gargle. If in addition, there is a catarrhal condition of the lining of the nose, douching with a hot alkalin solution is beneficial. A very efficient and inexpensive preparation is the following combination: 20 drops of carbolic acid to 1½ ounces each of sodium biborate and sodium chlorid. A half a teaspoonful of this powder should be used to every glass of hot water and the nose should be douched three times a day with a small soft rubber ear and ulcer syringe. The head should be bent forward and downward over the chest to prevent the fluid from flowing into the Eustachian tube and the middle ears.

Finally it should not be overlooked that after all the throat is only a part of the body and what affects the whole affects the part. Any constitutional ailment which debilitates the individual will impair the normal functioning of the vocal mechanism. Anemia, undernourishment, dissipation and constipation are the more common general causes of throat stiffness. When any of these conditions are present they are to be overcome by hygienic and therapeutic measures before speaking or singing is undertaken as a career.

However, all these medical measures are only symptomatic remedies and do not strike at the root of the trouble. They alleviate, but do not cure. Douching, spraying and gargling, no matter how well done and how conscientiously carried out, will not overcome the throat stiffness if the voice is improperly used. The real cure is a long rest followed up by a change in the vocal habits and the institution of a correct system of voice production.

As soon as all the visible pathological conditions in the nose and throat have been removed and the vocal cords have regained their normal appearance and sharp knife-like edges a carefully selected course of studies may be allowed. In the beginning the voice should be exercised at a lower pitch than the usual, the high register should not be attempted and proper breathing must be learned. Gradually the period and range of exercise may be increased until normalcy is regained. During this reconstruction or retraining period the throat should be examined at regular intervals to guard against the possible return of the causative factors. The cure of throat stiffness is a long and tedious affair and it requires faithful adherence on the part of the patient and great patience and judgment on the part of the laryngologist.

103 East 10th Street.

A NEW DEVICE FOR EAR MASSAGE.*

Dr. Harold Hays, New York City.

Some form of mechanical massage apparatus seems to be most necessary as an adjunct to treatment of middle ear deafness. The majority of patients enjoy this form of treatment and many of them think they are benefitted by its use. There is no question that many patients think that they hear better after a vibration to the drums, even when it is impossible to ascertain this improvement by the tests for hearing acuity. During the past few years, various types of instruments have been devised for the purpose of massaging the membrana tympani and to increase the circulation in the middle ear. The writer has tried many of these instruments but has found two decided objections to them. In the first place, none of them is mechanically perfect and, secondly, he was never satisfied that they exerted any marked beneficial influence upon the drum or middle ear either when used as an external massage or when the vibrations were sent through a Eustachian catheter.

The comprex oscillator designed for the author in March, 1924,* has now been perfected. It was designed with the view of overcoming the inadequacies of machines now in use for this purpose. Although primarily intended to produce a thorough and effective ear massage, this device has proven itself applicable to a great many purposes and a valuable aid to the physician.

The apparatus consists of a small universal electric motor having directly connected to it a one-cylinder, air-cooled pump. This assembly is suspended from a bracket as shown in the illustration. The base contains a rheostat which controls the motor speed by means of a small indicated dial. The vibrations are created by the rapid strokes of the piston which forces the air through an opening in the top of the cylinder. To this opening may be attached a suitable device for carrying the vibrations to the ears. The novel features of this apparatus are its speed range, from nothing up to 8000 revolutions per minute, and its light weight, which is 5½ pounds.

The amount of air current must be accurately measured for each case. This is best done by placing the ear connections lightly in one's own ears. A notation may be made for each case by the mark on

*Presented before the Oto-Rhinological Section of the A. M. A., June, 1924.

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the rheostat and also on a special indicator, which is placed on the air outlet but which is not shown in the illustration.

The writer has used this type of instrument for over a year and is satisfied that it is very serviceable. He does not feel that it will replace any other form of treatment nor that it, in itself, will improve hearing, but it does exercise an influence on the drum and possibly causes circulatory changes. That a change in the circulation in the drum takes place can be readily demonstrated with this new instru-

The above device is made by the Comprex Oscillator Corporation, 775 East 143rd street, New York City.

ment: for examination with the electric auroscope will frequently show that the drum has changed from dull gray to a faint pink.

For the ordinary forms of massage a suitable applicator is attached to the rubber tubing which transmits the vibrations. This massage is characterized by its vigor and remarkable penetration.

Both suction and compression can also be obtained, the suction for all forms of evacuation and the compression for spraying and similar uses.

22 West 74th Street.

A SIMPLE DACRYOCYSTORHINOSTOMY FOR THE CURE OF DACRYOCYSTITIS.*

Dr. Frank M. Hanger, Staunton, Va.

It is now an accepted fact, that dacryocystitis is the result of a strictured condition of the nasal duct, and generally produced by the extension of an inflammation from one of the nasal sinuses: the maxillary antrum, the ethmoidal cells, or frontal sinus, named in the order of causative frequency.

In order to effect a cure, normal drainage from the lachrymal sac into the nose must be re-established.

If the sinusitis, which caused the condition, be active, it must be eliminated first, or, treated *pari passu* with any operative procedure on the nasal duct.

However, it is generally found that the sinusitis has disappeared, *vis medicatrix naturae,* and we are only called upon to overcome the obstruction in the nasal duct.

This has long been attempted by the oculists, and is so advised in all books on ophthalmology. Slitting the lower canaliculus and passing probes of increasing size, to overcome the strictured condition of the nasal duct, is the recognized procedure. Some early cases are thus cured, but, in cases of long standing, the results are so discouraging that very many of the leading ophthalmologists have now acquired the routine habit of extirpating the lachrymal sac, which cures the filthy pus discharge into the eye, but leaves the patient to weep, alone, for the rest of his life. In this advanced age of surgery, there is no operation which should meet with more drastic condemnation than this. For, it leaves a scar, is a mutilation, and a surrender to a condition, which, in the author's judgment, can be easily cured.

However, the ophthalmologist is not altogether to blame. The time was, when he referred these cases to the rhinologist; but, owing to the difficult technic of most of the intranasal operations commonly employed, and because of the use of a faulty surgical principle on which they are based, *i. e.,* a fenestrated opening—the nose-man has gotten little better results, in the cure of dacryocystitis, than the eye-man. Consequently, the ophthalmologist harked

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*Read before the Virginia Society of Oto-Laryngology and Ophthalmology at Lynchburg, Va., Oct. 21, 1921.

back to the selfish position of regarding everything as fish which came to his net, and went on, and is still going on, with the mutilating operation of extirpating the sac. And, as a natural consequence, these unfortunate patients have suffered;—torn, as it were, between hawk and buzzard. In January, 1915, the author published an article in THE LARYNGOSCOPE, entitled, "An Intranasal Operation with a Guide for the Cure of Dacryocystitis". Since which date, until two years ago, the operation has been performed as then described, with the most gratifying results. But, in as much as the technic has been modified to some extent, and some unnecessary instruments dispensed with,—thereby making the operation more simple and easier to perform,—it is deemed necessary to give somewhat of a recapitulation of the aforesaid article, in order that a better understanding may be had, and in order to induce some members of the profession to undertake the operation, because of its increased simplicity.

No discussion will be entered into, as to the merits or demerits of the numerous intranasal operations which have been devised for the cure of dacryo-cystitis. The easiest of them will be found difficult, and, as a rule, unsatisfactory in results.

They sound easy on paper, but are hard to put into execution by the average operator. The chief cause of their failure is, that the fenestrated opening, which is called for in nearly all of them, is made through bone and its coverings into the lachrymal sac and nasal duct.

Such an opening is apt to close and the old cystitis recurs,—it being a violation of a cardinal surgical principle, as before mentioned. The best of these operations can be found in Loeb's Operative Surgery on the Nose, Throat, and Ear,—a most complete and valuable work. The principle which underlies the author's operation is the conversion of the nasal duct into a gutter, and was first devised by him in 1913.

However, before advising the operation herein set forth, the author presupposes that failure has resulted from a fair use of lachrymal probes, accompanied by proper irrigation and medication. It is best to have an assistant in this operation. The only instruments necessary are Myle's nasal speculum, Struycken's nasal forceps, a large lachrymal probe,—Theobald's No. 13,—a probe-pointed canula, the same size and curve as the No. 13 probe, Schmeden's triangular-shaped punch forceps, medium size, of Huber's set, and the author's special right-angled *straight* punch forceps, with which

the gutter is made. However, the right and left *curved blades* have a distinct advantage,—all made to fit in a universal handle. One-half hour before the operation, ¼ gr. sulphate of morphia should be given hypodermically. The operation is by preference an office one, and is done with local anesthesia,—the patient being seated in a chair with a head-rest. Yet, it can be done under general anesthesia, with patient in a semirecumbent position. First, a few drops of equal parts of a 20 per cent solution of cocain muriate and adrenalin chlorid, 1 to 1000, are injected into the lachrymal sac. Then, a small probe, so moistened that pulverized cocain will adhere to

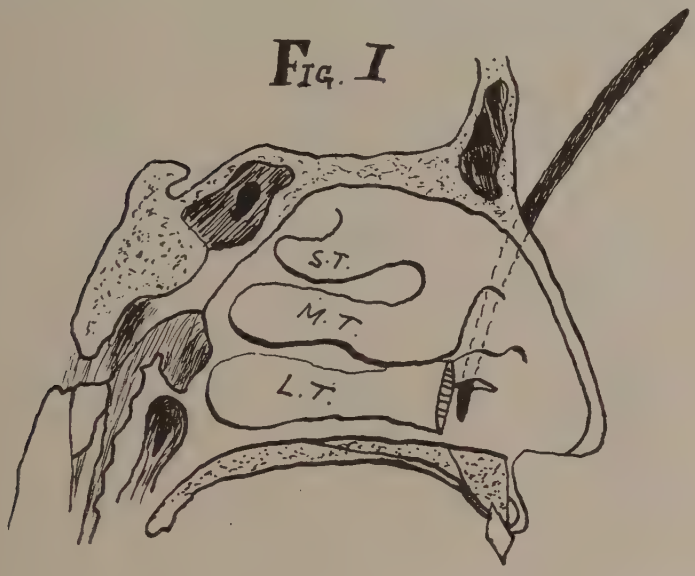


Fig. 1 shows the front end of the lower turbinated bone cut away and the large probe No. 13 in the nasal duct: the end can be seen in the lower meatus.

it, is passed into the sac and the cocain slowly worked down in the nasal duct, as far as the stricture. In a few minutes, the whole canal will be so anesthetized that larger and larger probes can be passed into the nose until Theobald's No. 13 can be passed without pain.

This probe is left *in situ,* while the inferior turbinated bone and the site over the nasal duct is rapidly cocainized and adrenalinized with a cotton swab,—special care being given to the under-surface of the inferior turbinated. Finally, inject the front one-third of

this bone and the site over the nasal duct and lachrymal sac with a 1 per cent solution of novocain with adrenalin. And, as an extra precaution, inject a few drops of this solution along the ascending process of the superior maxillary bone as high as the lachrymal sac by introducing the needle beneath the upper lip.

This should be done, even when a general anesthetic is to be used, in order to diminish hemorrhage. The front attachment of the inferior turbinated is now severed with Struycken's forceps, back a little beyond the lachrymal probe, and enough of the bone cut away with the triangular punch forceps to fully expose the lower end of the probe in the inferior meatus (Fig. 1).

The operation can now be finished by drawing the lachrymal probe or guide slowly upward, while the front or male blade of the

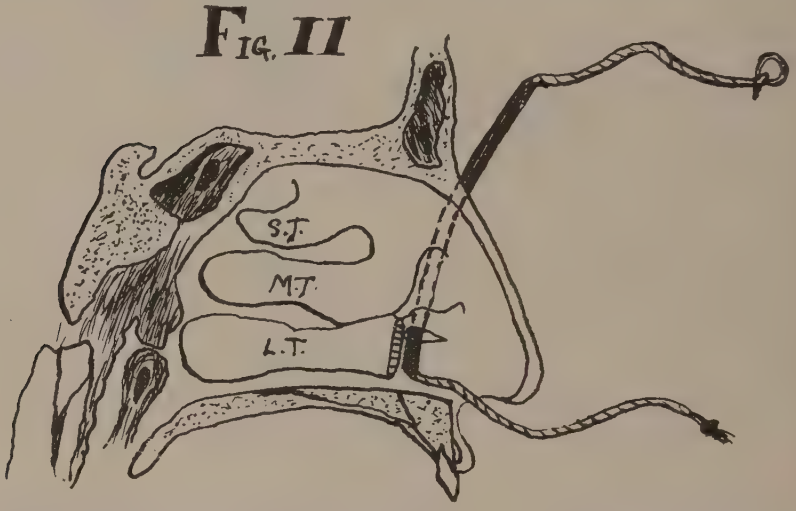


Fig. 2 shows the probe-pointed canula in the nasal duct bearing the silk thread, one end of which has been brought out of the nose to be knotted in the male blade of the special punch-forceps.

special punch-forceps follows in its wake and bites away, at several bites, the front inner wall of the nasal duct up beyond the stricture *into the sac;* thus, converting it into a gutter. While doing this, the male blade must be directed upward, forward, and inward, by depressing the handle of the forceps downward, backward, and outward.

In the nature of the case, the front inner wall of the duct is cut away, leaving the posterior edge of the gutter with a muco-osseous flap which extends forward, and, if left, will eventually become adherent to the front edge and block up the gutter. This flap must

always be cut away, with the triangular-shaped punch forceps. The male or movable blade must be kept in the gutter when this is being done; otherwise, the flap cannot be cut away.

In this manner, the author has performed the operation for five years; but, having found it, at times, more or less difficult to orient the male blade and cause it to follow the probe, because of too much blood or misbehavior on the part of the patient, the technic, at this point, has been changed, by withdrawing the large probe entirely and passing the probe-pointed canula, carrying a strong No. 3 silk thread twelve inches long, knotted on the probe end,—the knot being partly embedded in a counter-sunk cavity, and too large to be

Fig. 3 shows the operation completed; the gutter cut and the special punch-forceps removed from the nose, and the probe-pointed canula from the nasal duct.

drawn into the canula—2 or 3 m.m. of thread are left extending beyond the knot. The end of the thread is caught and drawn from the nose and the knot cut off (Fig. 2).

The end of the thread is now passed through the hole found in the top of the male blade of the forceps, from back to front, and knotted on the front face of the blade, so it cannot be withdrawn from the blade,—the hole being counter-sunk on front face of the blade to receive the knot. Now, by pulling on the thread, above at the eye, the point of the male blade is brought tight against the

probe end of the canula and the thread fastened in the two notches found at the top, to keep the point of the blade in this position. Then, your assistant draws the canula slowly upward, the male blade is caused to follow and the gutter made with the greatest ease.

At the same time, the operator directs the male blade upward, forward, and inward. In fact, this change in the operation makes it fool-proof, and the most inexperienced operator can perform it.

The operator can tell when the gutter has been cut high enough, own weight, as the inner wall of the duct has been cut away and by the ease with which the probe can be reintroduced into the nose, and, besides, it will fall towards the outer canthus of the eye of its gives it no support.

It is best to pack the nose with a strip of gauze, for twenty-four hours, to prevent the possibility of hemorrhage.

A large No. 12 or 13 lachrymal probe should be passed and the sac irrigated daily, until natural drainage of tears is established; this should be the case, in a week's time, if not sooner.

However, as an extra precaution to insure proper healing and to keep down excessive granulations, the edge of the gutter should be mopped with a 40 gr. solution of silver nitrate, every two or three days, for several weeks. This should be done while the probe is in place, and the superfluous solution washed off before it is withdrawn; and, as it is withdrawn, the point of the probe should be carried inward toward the septum of the nose and caused to sweep up the length of the gutter in order to break up any adhesions of its edges.

Notwithstanding this precaution, the gutter never remains as high as it was cut, but heals down from its apex, several millimeters, forming a web-like valve which *may* require removal, because of being tight enough to obstruct the passage of tears from the sac. However, this is rarely the case, and a second removal of the valve is never necessary.

The objections to the operation are two: First, the sacrifice of the front part of the inferior turbinated bone. As for this, the author has never seen a nose which became dry, or seemed to appreciate, in the least, this loss of bone. Second, the passage of air from the nose to the eye, when the nose is blown forcibly, with the possible carrying of infectious material to the conjunctival sac.

This passage of air only remains permanent in a few cases,—the web-like valve preventing it; and, when it does exist, is regarded as a mere bagatelle by the patient. It has never caused conjunctival

infection, in the author's experience. Besides, it can be artfully prevented, by holding the tip of a finger on the inner canthus of the eye, whenever the nose is blown, or better still, by blowing the nose gently, and not like a fog horn.

The simplicity of this operation, the ease with which it can be performed, and the absolute certainty of cure are bound to appeal to many of the profession, even to the lachrymal sac extirpator.

In conclusion, the author only asks that the ophthalmologists will give their dacryocystitis patients, which they have pronounced incurable, at least, the chance of being cured by this operation, before subjecting themselves to the humiliation of extirpating the lachrymal sac and consigning these unfortunates to the hopeless condition of an annoying epiphora. Yet, they claim that the lachrymal gland secretes fewer tears, after this operation, and the epiphora is not bothersome. The author believes in cell intelligence. The reparative power of diseased and wounded tissue can only be thus explained. But, when an operator claims for the lachrymal gland that human astuteness of ceasing to function, because he wishes it to be the case, after he has extirpated the sac, is merely hiding behind a smoke screen and administering soothing syrup to a guilty conscience for a piece of unpardonable surgery. It matters not where the breach in the continuity of the drainage system takes place, whether in the canaliculus, sac, or nasal duct, the tears are secreted just the same, and their overflow a constant quantity, under a given irritation.

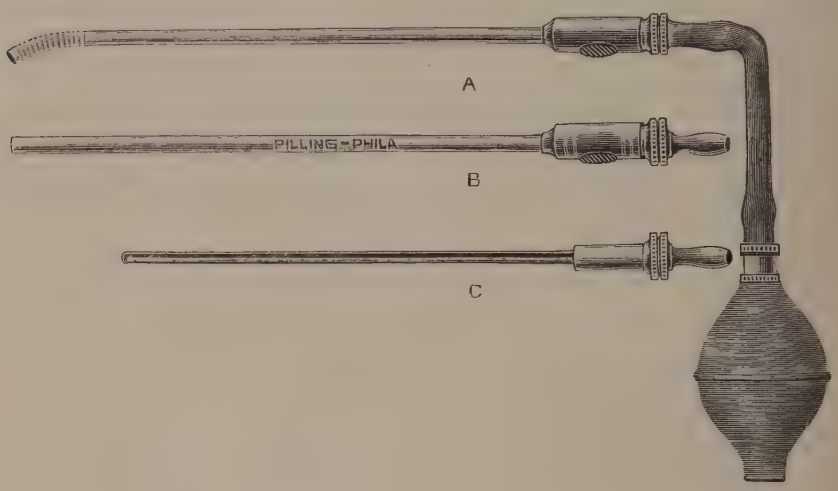
A reliable cure for dacryocystitis has been a long-felt need in the medical profession, and from the author's experience with this operation,—having failed to cure only one case in sixteen since its origination,—he cannot help but believe the day will come when the torturing lachrymal probe and the wearing of useless styles and canulae will be relegated to a much deserved limbo, and be regarded as curios of an ignorant past, and the lachrymal sac extirpator will repent, and finally become as extinct as the dodo and the mastodon.

A NEW BRONCHOSCOPIC POWDER INSUFFLATOR.*

Dr. Louis H. Clerf, Philadelphia.

Pneumonography or lung mapping has a wide field of usefulness in diagnosis and localization of diseases of the lungs. It depends primarily on the insufflation of a dry, finely divided, radiopaque substance into a part of the bronchial tree.

The insufflator shown below (Fig. 1) consists of a long hollow tube which is fitted with a gutter-shaped carrier. This can be removed from the outer cylindrical tube. The gutter is fitted with a cone-shaped end which fits accurately into the sleeve of the outer



tube. To its proximal end is attached a common hand bulb. To fill, the gutter is removed from the outer cylinder and powder is loosely scattered throughout its entire length. It is then returned into the cylinder. The looseness of the powder decreases the tendency to clog when blown out. Should it clog the gutter-tube can be rotated within the outer cylinder.

These insufflators are also made with vertebrated ends to permit insufflation into the upper lobe bronchi or "around the corner".

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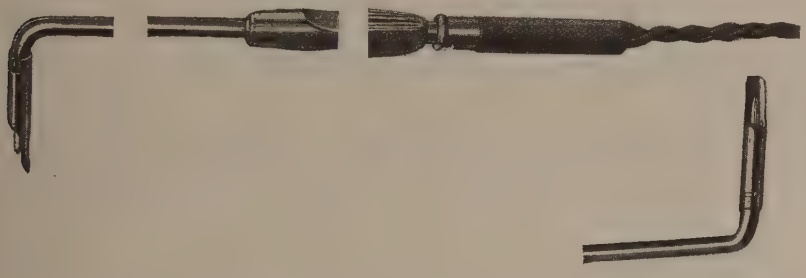
*Read before the Philadelphia Laryngological Society, Oct. 16, 1924.

A COMBINED ILLUMINATOR AND RETRACTOR FOR RADICAL SINUS OPERATIONS.

Dr. William Spielberg, New York City.

With the ordinary means of illumination employed at the present time, and the profuse amount of bleeding in the radical maxillary and frontal sinus operations, it is rather difficult to obtain a good view of the interior of the sinus cavity; the operator is frequently satisfied to remove as much of the diseased tissue as he possibly can see or find by a systematic curettement of all surfaces, leaving the rest to take care of itself.

In order to assure a good and thorough illumination of the interior of the sinus and so make the complete removal of all diseased membrane possible, I have devised an illuminator which can be carried into the sinus cavity and used both for illumination and retraction.



The illuminator can be placed in any desired position. It lights up the sinus so perfectly as to make every particle of membrane visible to the eye of the operator and assistant.

Before the instrument can be used to advantage, all bleeding must be stopped. The cavity or sinus is therefore packed with gauze saturated with adrenalin 1/1000 and left in for 2 to 3 minutes. The packing is then slowly removed, the illuminator introduced and the antrum curetted under direct illumination.

Especially is this instrument valuable in the terminal stage of the operation, when most of the diseased membrane has been removed, bleeding controlled, but small areas of uncuretted membrane or polypi still remain and can be seen by this method of illumination only.

I wish to express my indebtedness to the Pfau Surgical Instrument Company for the construction of the instrument.

211 Henry Street.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

Regular Meeting, December 12, 1924.

Symposium on Minutiae of Surgical Technique. a. Jugular Ligation.
Dr. Isidore Friesner.

One of the most important steps in jugular ligation is the first one, the arrangement of the patient's position to facilitate access to the deep tissues of the neck. The patient should lie with the shoulders flat across the table; the shoulder of the operative side should be raised by means of a folded sheet and a sandbag placed under the neck so that the head falls somewhat downward; the head is supported in this position by a second folded sheet, which is less thick than either the sheet under the shoulder or the sandbag under the neck.

Then, of course, the proper incision dissection. In exposing and ligating the jugular vein, I have been accustomed to make an incision beginning above on a line from the tip of the mastoid and extending downward to the middle of the suprasternal notch. I begin the incision above at about 3⅓ inches above the suprasternal notch, extending downward 2½ inches. Then, if you do the dissection carefully and slowly you can see the various structures through which the dissection is made—the skin, the superficial fascia, the platysma. As a rule, the incision is made too far back, so that after the platysma is incised one is compelled to dissect it forward in order to find the anterior border of the sternocleidomastoid muscle. I have now dissected the skin and superficial fascia away, so, and I exposed the platysma, separating it from the skin. You will notice that the fibres run in this direction. This is the anterior border, here, of the sternocleido muscle. Now, after having found the anterior border of the sternocleidomastoid muscle, an incision is made immediately in front of it. One must remember that the sternocleido thins out a great deal in this situation and that furthermore in front of the sternocleidomastoid is very frequently found a fairly good sized vein—the anterior jugular—and this should be avoided.

After having made the incision in the deep cervical fascia immediately in front of the sternocleido muscle, the muscle is picked up and by blunt dissection is pushed back, exposing the omohyoid. Above the omohyoid is the deep cervical fascia, and internal to that the carotid sheath. When the deep cervical fascia is thoroughly exposed, we take two pairs of anatomical forceps, and by gently tearing across it expose the vein. A grooved director is first introduced upward along the course of the vein, the fascia sheath slit, and then grooved director is introduced downward along the course of the vein and the deep fascia sheath slit. The deep cervical fascia and the carotid sheath are clamped by artery clamps and an assistant pulls on these clamps so that the fascia and vein are brought fairly superficially into the wound. When the vein is in this situation, it is grasped by the anatomical forceps and separated from the carotid sheath until it is completely free; then by means of the anatomical forceps or an aneurysm needle, a loop of chromic catgut is carried around the vein. This loop is tied, first above as far upward as I can get and the vein is stripped out by the other loop—the lower loop—which is then tied, the two ligatures being separated by each other by an inch. Between these two ligatures the vein is cut. The ends of the lower ligatures are cut away; the upper ligature is left *in situ*, and a piece of sterile adhesive holds it to the skin.

The purpose of that is that should it be necessary to excise the vein

the chromic gut leads to the upper end. We have found excision necessary in a very small proportion of these cases, perhaps not over 2 per cent, after ligation.

The wound, that is the skin and fascia after the vein is ligated and cut, are sutured, leaving a drain in the space caused by the obliteration of the vein. Sometimes after the removal of the drain of folded rubber tissue the wound heals by primary intention; occasionally it becomes infected.

Now the specimen is dissected further here to show the relationship of the arteries and the nerves. A few days ago a general surgeon made the suggestion that inasmuch as the glands of the neck and goiter operations are removed through a horizontal incision with good cosmetic results that it might be well to do jugular ligations in the same way. The disadvantage of the vertical scar is that some months later it has a tendency to spread out, and that whereas at first you see only a ridge, at the end of six months or a year after you are apt to see a very broad scar.

On the other side of this head, I tried this dissection. The incision here is rather more horizontal than one would like, but it shows the degree of exposure that one can get in this way. Here is the skin, superficial fascio, and platysma dissected up; the border of the anterior sternocleidomastoid, and the omohyoid. Here is the vein. I believe that through this exposure one could as readily resect as through the vertcal incision; and surely, judging from the results the general surgeons get in goiter operations this incision might be better in jugular resections. I have not yet tried it, but I am sure that it is feasible and I am confident that the cosmetic results would be better.

Jugular Resection. Dr. Arthur B. Duel.

The task set for the readers of the papers tonight has been simplified by presupposing that a diagnosis of septic sinus thrombosis has been made, and that they are to discuss methods of dealing with the problem.

This situation may be confronted in a very straightforward and accurate manner.

Give a case of septic lateral sinus thrombosis: what surgical measures should be employed? To my mind, the answer is:

First: Isolate the area of infection: convert an infection, which is lying in one of the large channels of the blood stream, producing a septicemia, and threatening a general pyemia, into a localized abscess. Do this as early and effectually as possible.

Second: Having cut off the focus of infection from the general circulation, deal with it as you would with any other localized abscess. Evacuate it as thoroughly as is consistent with the safety of surrounding structures.

Always keep in mind the fact that, if adequate drainage has afforded, the septic focus will take care of itself. The imminent danger to life is passed once the focus has been isolated from the main current of the blood stream. Strategically speaking, when these positions have been secured, the battle is won.

But—always provided:

First, that the area of infection has been isolated from the general circulation *in time* to prevent the dissemination of foci to kidneys, splee, liver, lungs or elsewhere: and—

Second, that the isolation has been accomplished with such judgment and skill that the patient has not been exhausted by the effort.

The time element is of such great importance that one may fairly say a perfection of technique, which in the early stages would almost certainly cure the patient, might, in the later stages, offer only a small chance of success.

It was from this very important consideration that I was led to say at the outset, given a diagnosis of septic sinus thrombosis, isolate the infection as early and as effectually as possible.

As to the advisability of early operation in the interests of the patient there will hardly be any adverse discussion.

The question as to the advisability of the second postulate, *viz:* that the isolation be made as effectually as possible, might well bring out a diversity of opinion, in a large class of cases where the infected thrombus is a parietal one, only partially occluding the lumen of the sinus; or even in another class where a completely occluding thrombus occupies a limited area in the sigmoid portion of the sinus or the jugular bulb. In either of these types it is possible to evacuate the thrombus, either wholly or partially, by opening and curetting the sinus.

In my opinion this is a most undesirable procedure for many reasons.

First: It is accompanied by a terrific hemorrhage; a depletion which a patient can ill afford.

Second: It is done hastily, inexactly, and is more than likely to leave a portion of the clot.

Third: Even if it were completely removed, the infected sinus wall is left to act as a focus for another thrombus.

Fourth: Granting complete removal, the method may easily dislodge pieces of infected thrombus, which, carried to distant parts, may create havoc.

Taking into account the depletion from the loss of blood and the uncertainty of success, the saving of time does not offer a sufficient compensation for its employment.

In a word, the presence of septic thrombus in the lateral sinus is too great a menace to life to warrant the use of any but the most effective measures of combating it.

Whether or not you all agree to this very positive conclusion, the statement of it places me logically in a position to present the few points in technique which I have been invited to submit.

As you all know the venous current sweeping around on either side from the torcula Herophili passes through a long stretch of the lateral sinus before any other branches empty into it.

Near the knee of the sinus, the superior petrosal and the mastoid emissary veins empty into it. Again, at the bulb, the inferior petrosal empties into it. From the bulb on in the jugular there is another long stretch before the facial joins it. Still further below, the thyroid vein.

Thrombosis of the lateral sinus, resulting from an extension of infection from the mastoid, starts in the wall of the vessel somewhere from the knee to the jugular bulb. This thrombus may build up until it has extended to the torcula in the distal end; or through the length of the jugular to the innominate vein, in the proximal end. In recent years, since the early recognition of sinus thrombosis has been made possible in a large majority of cases, one seldom encounters these extensive clots, which were not so uncommon two or three decades ago.

The majority of cases now operated have usually a parietal clot, occasionally an obstructing clot, in the sigmoid flexure or in the jugular bulb.

Anatomically, the venous channel, as I have briefly described it, offers an ideal arrangement for carrying out the plan of isolating the thrombus from the main venous current. At the torcular end the sinus can be readily constricted far beyond the clot and far beyond the confines of the inflammation of the sinus wall. In a similar manner the jugular may be constricted in the neck.

There are three steps in the operation, *viz: First*, the treatment of the jugular in the neck; *second*, the treatment of the sinus in the posterior cranial fossa; *third*, the evacuation of the clot.

I have indicated the steps of the operation in the order in which I believe they should be done.

I realize that this is particularly a kind of surgery in which everyone develops his own method of work, and I trust you will bear with me when I say that the technique I describe is to point out *how I would do it* rather than *how you should do it*.

The operation in the neck, in a large percentage of the cases, is likely to be a clean one, undertaken merely to cut off the main blood stream somewhere below the jugular bulb, the point to be determined by inspection after exposure of the jugular.

As a consequence, if done at the outset, the surgeon and his assistants have not soiled their hands and instruments by working in the infected mastoid area and an aseptic wound is assured with less loss of time. The work may be completed in the neck and often closed and a dressing applied before the sinus wound is touched, thus assuring primary healing and a less conspicuous scar.

The neck is stretched over a sand bag, the chin being elevated and everted to the opposite side until the contour of the sternocleidomastoid shows plainly from the mastoid to the clavicle. The skin over the side of the face, neck down to the chest, is sterilized with a 5 per cent solution of iodin, which is afterward partially removed with 95 per cent alcohol to prevent blistering.

The initial incision is made from about one inch below the mastoid tip downward and forward across the anterior border of the sternocleidomastoid muscle to about one-half inch from the median line of the neck. It is carried through the skin and the platysma myoides muscle to the deep fascia. The external jugular in the line of this incision is clamped before dividing it, thus avoiding a troublesome and unnecessary hemorrhage. The skin and platysma incision is held open by blunt retractors. The deep fascia is incised almost perpendicularly along the border of the sternomastoid. All bleeding points are clamped and, if numerous enough to clutter the field, are ligated.

The dissection from this point is carried on entirely with blunt dissecting scissors and blunt dissecting forceps, in order that a clear view of the field may not be obscured by hemorrhage.

The muscle is dissected backwards and upwards until the jugular is uncovered for an inch and a half to two inches. The sheath is opened and the facial exposed as it enters the jugular.

By inspection and pressure with a finger or blunt forceps it is determined if there is an inflammatory thickening of the wall of the vein and if the vein fills freely from the facial when occluded above it; then, with the facial occluded if it fills from the bulb.

If collapsed above, or filled with a clot, or thickened by inflammation of its wall, the dissection is carried downward past the thyroid and even behind the clavicle until a normal appearing vein is found. Where the dissection has to be carried low in the neck the original incision may be carried, in a gentle curve, along the border of the sternomastoid, to the sternoclavicular joint, if necessary.

This rarely happens in my experience, however, and in such cases the shorter initial incision makes a much less disfiguring scar.

At whatever point the vein appears to be normal, leaving a wide margin for safety, ligatures are placed, a quarter of an inch apart, and the vein is severed between. The long ends of the lower ligature are cut close to the knot before the vein is severed, to avoid the accidental pulling of the ligature off from the distal end of the vein. The long ends are left on the upper ligature, fortified by a light clamp, to facilitate handling the vein while dissecting it from the bed.

In a large majority of my cases the clot had not extended below the jugular bulb. It was possible, therefore, to save the circulation through the facial and thyroid veins, and avoid a very long scar and the unnecessary mutilation of the neck by a dissection from the clavicle to the jugular foramen. In such cases this can be done without in the least jeopardizing the chance of success, which depends on cutting off the infected clot from the general circulation.

Where the clot or inflammation of the walls of the vein extends well down in the neck, as the dissection proceeds upward to the thyroid and facial veins, in the resection of the jugular they are secured by double ligatures, and divided between.

Inflamed cervical glands, unless they are broken down or mechanically impede the dissection, are not removed.

In a few words then, the vein is exposed without undue traumatism; inspected; ligatured at the highest point consistent with safety; and

resected from that point upward to a short distance from the jugular foramen where it is ligatured and cut off.

If the gross appearance shows that the phlebitis has extended into the neck, the wound is left open until symptoms of sepsis have disappeared, when a plastic operation is done to improve the appearance of the scar. Otherwise, the wound is closed with a few catgut sutures in the deep fascia, and Michel clamps in the skin; the latter being removed in twenty-four to thirty-six hours.

The isolation of the thrombus in the proximal end, having been thus accomplished, the distal end is occluded in the following manner.

The sinus plate is opened over the sigmoid flexure at a convenient point below the knee by ronguer forceps and a sharp curette. From this point a wide gutter along the line of the sinus is made with a powerful rongeur forceps to a point at least one and a half inches from the knee of the sinus, or as much farther toward the torcula as is necessary to expose a normal sinus for at least one inch. Before each bite is made the sinus wall is gently separated from the bony plate with a curved diretor. At this point the bone is removed so that the full width of the sinus is exposed to view, and the sinus is compressed by a plug tucked under the bone. I have found that perfect occlusion can be most easily accomplished by means of a compress made from a piece of soft rubber sponge, cut down to the proper size.

This sponge is prepared by boiling a fine quality rubber bath sponge until it is sterile and then cutting it up into different sizes, which are kept in an antiseptic solution. At the time of using, a stout silk suture is tied around the middle of the plug and it is then fashioned with scissors to the right size and shape. It is easily tucked under the bone, does not cause as much trauma by pressure on the underlying brain, and by means of the string is easily removed, being assisted by a wriggling motion with a bayonet forceps.

The removal is made in twenty-four to forty-eight hours, leaving a perfectly sealed sinus. I believe it is important to follow the sinus back with as little traumatism as possible and insert the plug to compress the sinus before doing any more extensive work on the bone. Any possible breaking up of the septic clot and dissemination of it, through the circulation by the torcular route, is thus avoided.

Once the plug is in position the bony gutter may be widened, if necessary, and the rest of the plate over the sigmoid flexure down to the bulb removed. The thrombus is now bottled up. The only possible avenue of infection into the general circulation is by a backing up through the petrosals.

While theoretically this may occur, I doubt if it often happens.

The evacuation of the thrombus, to my mind, requires more judgment than any stage of the operation.

The whole field is thoroughly washed with hot salin solution and flushed with a powerful antiseptic. A slit is made on the outer wall of the sinus just in front of the compressing plug. An assistant compresses the sinus just behind the knee to prevent bleeding if the petrosals are not entirely blocked off by the thrombus. The lower blade of a blunt scissors is inserted into the slit and the incision is carried forward for about an inch to the compress. The opened sinus is spread apart and the interior of the vein examined for a clot or evidence of inflammatory thickening. The sinus is now packed with layers of one-half inch packing gauze, soaked in a powerful antiseptic, up to the end of the incision and the compression is eased sufficiently to determine whether the petrosals are bleeding or are completely occluded by an obliterating clot. Should there be no bleeding the incision may now be carried by means of the scissors throughout the sigmoid flexure to the bulb. The incision is spread open and the walls cut away on either side, leaving the obstructing clot in position until the external wall is completely trimmed away as near to the bulb as possible. The clot is now gently lifted out with thumb forceps or a dull curette. The internal wall of the sinus is not curetted.

The very fact that the patient has no meningitis shows that locally the tissues have erected a barrier to the infection, and drainage, plus antiseptics, are all that is needed to promote healing. The wound is packed with layers of antiseptic gauze and a wet dressing applied.

When on removal of the compress there is a profuse hemorrhage showing that the clot is a parietal one, I believe it is a great error to waste time and a large amount of blood in an effort to dislodge a clot. Instead of this the sinus wall is rapidly incised from the knee to the bulb, laid open and packed with layers of gauze soaked in an antiseptic solution.

From one to three days later the packing is removed and the clot and sinus walls are then managed in the same way as detailed in the completely occluded sinus.

The whole wound is packed wide open with repeated dressings for a week or ten days, when, if all constitutional signs of sepsis have disappeared, a plastic operation is done to close the wound and hasten healing.

May I add a word for completeness of the picture?

With the modern methods of blood transfusion from carefully indexed and immunized donors, one would be neglectful who did not give his septic case this additional help.

The day has gone by when blood transfusions are reserved for cases in extremis, and I believe many a case is helped over the hill by this measure nowadays which would have lost with the most skillful surgery unaided.

Technique of Jugular Bulb Drainage. Dr. John McCoy.

Drainage of the jugular bulb is sometimes imperative, when we are confronted with a condition of suppuration in the bulb following a preceding mastoiditis and sinus thrombosis.

In approaching this surgical problem there are several important factors to be remembered; these are:

1. The position of the bulb. It is deeply situated in the neck, directly under the floor of the middle ear and in close juxtaposition to the facial nerve posteriorly and inferiorly.

2. The size of the bulb. In more than 50 per cent of cases the bulb is very deficient or even absent on the left side.

3. The contents of the bulb. Besides the upper end of the jugular vein, it contains three large and important nerves which pass through it; namely, the pneumogastric, the glossopharyngeal, and the spinal accessory. The spinal accessory, being situated laterally, is most likely to be injured by manipulation when we reach the bulb.

Keeping these points in mind, there have been several methods advocated, each of which accomplishes the desired result with a varying amount of difficulty as a surgical procedure, and with a varying degree of safety to the surrounding structures, especially the facial nerve.

The simplest of these is the skin fistula method of Alexander, in which the margin of the resected jugular vein is stitched to the surrounding wound, and in this way a direct path of drainage is established from the bulb.

Another method devised by Piffl is as follows: After separating the membranous canal wall as we do in the radical mastoid operation, and pushing aside all tissues up to the Glaserian fissure, we remove the floor and part of the anterior wall of the bony external canal to the hypotympanum. Having gotten this far the upper portion of the internal jugular vein makes it appearance.

A method devised by Voss is as follows: After exposing the sinus and removing the bone over it, the lower part of the vein becomes more and more horizontal, the lateral wall of the sinus becoming the inferior. The lower wall of the sinus is followed by removing bone with gouges. By following the course of the vein with a probe, the distance of the anterior wall of the jugular fossa can be determined. Exposure of the bulb is accomplished by very cautiously removing the bony wall above the anterior boundary of the jugular fossa. (To avoid injury of the horizontal semicircular canal the bone is not removed higher than one-

half centimeter.) The posterior membranous wall of the bulb is readily exposed in most cases where we have a well defined bulb. After the posterior wall has been removed up to the roof of the bulb, it sometimes becomes necessary to remove the edge of bone which marks the separation of the sinus proper and the bulb. This shows the sharp knee from where the lateral wall of the sinus goes into the posterior wall of the bulb.

A method devised by Whiting is as follows: By using the posterior semicircular canal as a guide, all the diploic bone immediately below it is removed, and in so doing the posterior aspect of the bulb itself frequently comes into view. Now, taking as a guide the point of utmost curvature of the sinus posteriorly, he removes in a direction downward and inward the occipital groove and the jugular process of the occipital bone to a level which he considers is the lowest part of the sinus. He then removes the bone covering the bulb and knocks off the knuckle of the foramen lacerum posterior. This gives a splendid exposure of the bulb, and through this a catheter may be passed down through the portion of the jugular vein remaining in the neck.

Another method is that of Grunert's, otherwise known as the "gutter" operation, which is as follows: First, a complete resection of the tip of the mastoid. Then separation of the three muscles from the base of the skull, namely, the sternomastoid, digastric and spenius capitis. The soft parts are retracted as we work toward the base of the skull in a horizontal direction, in order to reach the jugular vein. The operative field is sometimes considerably narrowed by a prominent transverse process of the atlas. This may have to be resected, in doing so one must be careful not to injure the vertebral artery. The rectus capitis lateralis is now pushed aside in order to remove the last bridge of bone between the free margin, and the jugular foramen. The bulb is now split open from the sinus end. This concludes the methods of attacks by way of the mastoid.

There is another method of approach by way of the neck devised by Tandler. The mastoid incision and the incision for the jugular are converted into one. The sternomastoid muscle is separated for its entire length, and pushed posteriorly. We now search for the spinal accessory nerve; when it is found it is tied loosely with a suture, so that it may be in good view during the operation. We follow the course of this nerve to its exit at the jugular foramen. The finger is now passed deeply into the wound, and we find the space between the styloid process and the mastoid process. Here the exit of the facial nerve through the stylomastoid foramen may be exposed. The digastric muscle is separated from the digastric fossa and pushed forward and downward. If we work on a line below the stylomastoid foramen and this muscle, there will be no danger of injuring the facial nerve. After pushing aside the digastric muscle the occipital artery may be ligated in two places and cut out. The jugular vein may now be separated from the margin of the jugular foramen, which can be felt with the finger. Now loosen the uppermost portion of the vein after pushing aside the periosteum at the base of the skull, and the rectus capitis lateralis. The bone is now removed from the sigmoid sinus to the bony margin of the jugular foramen, and the sinus bulb and vein are split wide open.

In conclusion, the writer believes that the most complete and well defined of the operations, which approach the bulb from the mastoid cavity is Whiting's. This operation, however, is not possible in all cases, especially those where the mastoid process is short and deep, or where the sinus is far forward. It is also our belief that the operative approach by way of dissection in the neck is applicable in all cases, and gives us the maximum of safety in avoiding traumatism to the facial nerve.

DISCUSSION.

DR. RAE expressed the pleasure he had experienced in listening to these three papers on sinus thrombosis. Unfortunately, there was little ground for discussion, since all would agree in the main with everything that had been said by each of the speakers.

It is quite important that shock be reduced to a minimum and for this reason there should be as little delay as possible in handling a thrombosis case as is consistent with thorough work.

Usually he himself is accustomed to regard all cases of sinus thrombosis as being properly divided into three classes: 1. The type of case met in hospital service, where the patient has been sent in for immediate operation and where in the course of the mastoid operation one discovers or suspects sinus thrombosis. 2. The case on which a mastoid operation has already been done and in which sinus thrombosis is suspected, without supporting laboratory evidence. 3. The case in which from all the evidence available one has made the diagnosis of sinus thrombosis.

In the first type on which one stumbles, so to speak, one does not feel at liberty to ligate or excise the jugular without determining so far as possible that the patient actually is suffering from thrombosis. The only way to do that is to explore the sinus. In such a case he makes a very free exposure of the sinus and opens it and if he determines then that he is dealing with a clot, he immediately stops work on the sinus and goes down and does the vein work; then goes back to the sinus.

In the second class, in which a sinus thrombosis is suspected, after a mastoid operation has been done, the procedure is practically the same: first of all expose the sinus freely, open it and if a clot is found leave the sinus alone, do the neck work and then, lastly, go back to the sinus.

In the third type of case in which the diagnosis of sinus thrombosis is made beforehand, he exposes the sinus completely but does not open it, then goes down into the neck and ligates or excises the jugular as the case may be and, last of all, goes back and opens the sinus as Dr. Duel had described.

There are one or two points to be considered. In exposing the sinus, Dr. Duel had spoken of separating with a grooved dissector and with a curette and biting away with the rongeur. Dr. Rae said he had given up that method a good many years ago, and now exposes the sinus with the widest gouge he can use.

Every otologist with sufficient experience must some time have opened the sinus accidentally. The danger of this is reduced to a minimum by the use of a wide gouge. The exposure can be made quickly and with the greatest degere of safety. The bevel on the under side of the gouge acts as an elevator and the instrument can be used over the exposed sinus, provided that it be wide enough to straddle the opening. In opening the sinus one must be very careful to open only the outer wall and this is sometimes not very easy, especially if we are handling a collapsed sinus. Should the deep wall of the sinus be opened one runs serious risk of a brain hernia.

Dr. Tobey in his discussion states that he is unable to think of a reason for excising the jugular vein. In a recent case in which there was doubt as to the presence of sinus thrombosis, but in which the clinical evidence seemed to call urgently for ligation of the jugular vein, a small part of the vein was removed between ligatures. Culture of this small part failed to show any growth and microscopical examination exhibited a normal vein wall. Surely this was testimony that could not be obtained without removing a part of the vein.

Dr. R. T. Atkins said that the subject had been so thoroughly covered by the readers of the papers and also by Dr. Rae's discussion that he was not able to add anything of importance. He had noted with interest, however, that the technique of the various procedures varied according to, perhaps, the hospital with which the operator was attached. Everyone is influenced by the technique of his hospital associates; that also holds true for parts of the country outside of New York. For example, in a nearby city, the technique for sinus thrombosis consists of one particular operation to the exclusion of any other. The general surgical principles involved art the same in each case; the indication for operation is the same. The aim is to remove from the

lateral sinus the jugular bulb and internal jugular vein the septic material and to shut it off from the general circulation. If one looks over the statistics of the various operators he will probably find that the percentage of recoveries does not vary a great deal, and it would seem that the type of the operation is not so important as the time of the operation. Early diagnosis and early removal of the focus of infection will probably reduce the mortality to a greater extent than the particular type of operation or the particular operative technique. Dr. Atkins said that this, of course, was not in line with the subject of the papers, but, as he had already stated, that had been so thoroughly treated that he could not add anything.

Dr. George Tobey, Jr., said that the papers had been very thorough and it was impossible to go into any discussion of them, but that he wished a little elucidation on one or two points that had been brought up. The horizontal position had been a pet of his for about fifteen years, and about thirteen years ago he had presented pictures and charts in this very room showing the slight deformity following this operation. The technique as carried out in Boston is to have the patient on the table lying on the back with the head slightly downward, and then, while the patient is still in that position to select the wrinkle nearest the thyroid and with a sharp knife simply scarify it. The patient is then turned back to the other position and the deep incision is carried out through the platysma, first locating the external jugular vein, making the incision only one of one and one-quarter inches in length. As soon as the incision is made through the platysma, the remaining resection is readily carried on with the Mayo scissors. It is rather amazing the amount of room one can get through the horizontal position.

Dr. Tobey said they had been doing that for over fifteen years, and as yet had found no reason for changing it. It is very simple if you find the clot extends below the facial, either to make this incision a little longer or to go below and make a similar incision or a vertical incision below; but it is only very seldom that you find the involvement below the incision, and that incision will also bring you to about where the facial vein comes in.

Another point which he had not quite understood was the persistency of cutting the jugular. For years that had seemed to him a more or less unnecessary procedure. By taking two ligatures and causing alternate pressure on the upper or lower you can very readily determine the question of patency of the vein. Before ligating, with one or two ligatures and leaving them, he could not see the object of cutting the vein, for it left an opening and the possibility of infecting the neck immediately. It also opens up the possibility of the patient's vomiting or being restless and having these ligatures slip. Dr. Tobey repeated that he could not see the advantage of cutting the vein after tying it.

Recently he had been making some observations, one of which he wished to put on record; that is in the question of a double mastoid with lateral sinus symptoms: which lateral sinus is infected? Recently he had been carrying out observations in placing the manometer either in the cisterna or in the lumbar region. In a case where he had ligated the jugular vein and obliterated the lateral sinus, by pressing over the region of the jugular vein on the side operated, there was an increase of relatively about 10° in the spinal fluid, but the moment the pressure was applied to the unoperated side the pressure immediately arose so that it spurted out of the manometer which carried 280.° It did it invariably. That was repeated for ten days, and after drawing out 40 c.c. of fluid—the case having meningitis at the time—the relative degree of pressure was very marked, no matter how much it was reduced in the spinal cord. It was true in the cisterna and in the lumbar region.

Referring to the question brought up by Dr. Duel—that he doubted very much whether the petrosals filled with thrombus following thrombosis of the lateral sinus—Dr. Tobey said they had carried out a number of autopsies. This case referred to also went to autopsy: the sinus was obliterated three weeks before death, and on autopsy it was found

that beyond the point of the sinus thrombosis, towards the torcula, there had been on extension of the clot, and the intima was smooth. It was also found (and the same has been observed in other cases) that there was an almost film-like blocking of the distol ends of the superior and inferior petrosals, and practically free fluid blood throughout the remaining course of the petrosals.

An internal pachymeningitis on the inner aspect of the infected sinus is very seldom found.

Dr. Duel spoke briefly about the method of plugging the sinus in the posterior fossa. As all know, the sinus is easily compressible in that location. For many years he had used a plug of rolled gauze, as is usually done, but about five years ago the idea occurred to him to use a cylindrical-shaped roll of rubber sponge that had been thoroughly sterilized by boiling and fashioned for each case at the time of using. He had learned that by using a fairly large plug—as large as the end of the little finger and making compression by crowding it between the outer wall of the sinus and the overlying cranium, it occluded the sinus much better and with less pressure on the brain. He had not meant to imply that in every instance this rubber plug could be removed in twenty-four or forty-eight hours, but stated that he had done this several times and found the sinus blocked off perfectly, so that he could with perfect safety replace the plug with a loose gauze packing instead of maintaining very hard pressure for a number of days. The various instruments that have been devised to occlude the sinus had not in his hands been as satisfactory as this rubber plug. He wished to reiterate that he had simply told how he *would* do the operation, not how others *should* do it.

Dr. Whiting expressed his interest in the papers that had been presented and said that one or two very practical points had been suggested which might be still further considered. He had been very much interested in what Dr. Duel had said about removing the plug at the torcular end of the wound within twenty-four hours with the assurance that he would not encounter hemorrhage from the torcular side. Dr. Whiting said that he had had some very unfavorable experiences in that matter. In three cases he had had bleeding on the eighth, twelfth and sixteenth days after the operation, from the torcular side, notwithstanding that there was a very firm and obstructing plug in place. In consequence, as a control and as a measure of greater safety it has been his practice ever since, after plugging off the sinus toward the torcular side and after the contents of the sinus have been removed to apply with a cotton tipped probe a solution of 1:500 bichlorid to the visceral and parietal wall under the plug which holds these two walls in contact; there is set up immediately an adhesive inflammation which has served to avoid the unpleasant experiences previously encountered a good many days after operation. With the use of this simple device he had no longer had any bleeding after removal of the plug.

Having questioned Dr. Duel's procedure, Dr. Whiting said he wished to ratify the observation that not too much time should be expended in an effort to clean out the parietal clot. When you have plugged off the torcular side and have control of the jugular bulb, if you open the sinus and find only a parietal clot you may get a good deal of bleeding, and the patient will lose a great deal of blood, which he can ill afford. It is a matter of great importance simply to open the sinus and plug it properly rather than to exsanguinate the patient during the attempt to remove the parietal clot. The clot can be removed subsequently with small loss of blood.

Dr. McCoy had referred to a procedure in reference to the extirpation of the jugular bulb on which Dr. Whiting said he had been working for two or three years, with the object of modifying or minimizing the tremendous operations which have at times been considered necessary in consequence of unsuccessful operations for sinus thrombosis where the clot has been cleaned out in the sinus and the jugular has been either resected or tied, as the case may be, but the patient instead of

going on to a favorable recovery continues to show septicopyemic manifestations. When the dressing from the bulb is removed and pressure made under the angle of the jaw pus wells up from the wound. Dr. Whiting said he had seen a case not long ago where on slight pressure a dram or two of pus came out. Such a case as that cannot get well unless adequate drainage of the bulb is established. The operations Dr. McCoy had referred to, the Gruenert and Tandler operations, are very formidable procedures. Dr. Whiting said that he had tried the operations frequently on the cadaver and considered the latters especially a very formidable procedure; and for that reason had devised the method he now uses.

In the ordinary mastoid, as encountered, with well developed pneumatic cells and a broad process, there is ample room to do the procedure. Occasionally when the mastoid is very narrow, where the sinus lies far forward close up to the posterior wall of the bony meatus, one does find extreme difficulty in the procedure. In fact, in one case performed on the cadaver not long ago, a negro, Dr. Whiting said he could not get into the jugular at all, but ordinarily if there is a space of half an inch between the posterior boundary of the sinus as it curves around toward the bulb and the anterior boundary of the mastoid process, *i. e.*, premastoid lamina, the operation can be done without much difficulty. Suppose the sinus has been operated upon in the usual way and the case has not done well. A vertical line is made on the bone beginning on the convexity of the sigmoid groove just below the knee of the sinus and is extended thence downward through the occipital groove and into the jugular process of the occipital bone; all the included bone is removed and a moderately wide surface of the cerebellum exposed posteriorly; this gives ample space in which to cut away the bone forward toward the jugular bulb, either with chisel or bent rongeur, such as Dr. Bacon devised. This measure permits approach to the bulb.

The next step is to remove with a curette all the diploic structure which lies immediately below the semicircular canal. This is the important step. In bones of the pneumatic type this structure is very easily removed. Curette out the diploic bone beneath the posterior semicircular canal, and it will be exposed as plain as if produced in a wax model. You then have the jugular bulb immediately beneath a thin layer of bone. Then, with a chisel, break through that lay of bone and you are in the jugular bulb. It is no longer a question of approaching the bulb, you are in the bulb. The lower border of the posterior semicircular canal is slightly below the level of the floor of the tympanum. Consequently when you have fully exposed this structure you are immediately over the bulb and you can go easily into it. In enlarging the opening of the bulb care must be exercised not to injure the aqueduct of the vestibule, which lies in very close proximity to that part of the field.

Dr. Friesner said that the procedure which Dr. Rae had ascribed to him and which he had tried a few times on the living and about thirty-five or forty times on the cadaver, was a very simple one, and in the instances where it had been carried out on the living it had been found quite adequate. It does not give one the approach to the bulb that Dr. Whiting's operation does, but in the cases where it had been used it proved adequate. It is a complete exposure of the lateral sinus and enables one to look into the bulb. Dr. Friesner said he had demonstrated this before the Trilogical Society when it met in New York, and showed that we were a centimeter behind the bulb and passed a probe down into the bulb. One is not far behind the bulb in this procedure, but is not always possible to do. It depends upon the angle at which the sigmoid sinus crosses the lateral lobe of the cerebellum. It is the same procedure that is done in the Grunert operation. It appears that the Grunert operation endangers the facial nerve. Dr. Whiting's operation to some extent endangers the facial nerve; but you can do a complete dissection of the sinus by first removing the tip and then follow the sinus around and you can approach to the bulb with an adequate

exposure of the bulb and curette it without in any way endangering the facial nerve.

Referring to Dr. Tobey's remarks, Dr. Friesner said he was aware of Dr. Tobey's work and its presentation before the Section some years ago; but in this operation the vein is ligated at the omohyoid. About fifteen years ago he and Dr. Thompson studied this question and since then they had done about a hundred cases with the average results. In only two or three of these had it been necessary to resect after the ligation of the omohyoid, and the fear of re-establishing a circulation had always led him to cut the vein. Occasionally he simply ligated it, but he believed it wise to ligate with a double ligature fairly well separated.

Dr. McCoy said he had only a few remarks to add: In the first place, drainage of the bulb is an exceedingly rare necessity, and it is doubtful if any one otologist saw it more than half a dozen times in his life; but at the same time, when such a thing as suppuration in the bulb does occur and one is confronted with the problem of draining it, one gets very little help from the general surgeon, and it is up to the otologist to solve the problem.

He said further that he had stated his conclusions at the end of the paper, *i. e.*, that Dr. Whiting's method when available was the best, but that it is not always applicable. The method of dissecting from the neck up to the mastoid and finding the spinal accessory nerve offers a method which can be employed in every case. If he had succeeded in focusing attention on the possibility of such a condition and the means of remedying it he was greatly pleased. He certainly had enjoyed the other papers in the symposium very greatly.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, December 29, 1924.

Tuberculous Ulceration of Tonsil Associated with Pulmonary Tuberculosis. Dr. Robert C. Howard.

This patient is presented because of the relative rarity of frank, gross tuberculous lesions of the tonsils, and I am indebted to the Chairman, Dr. Francis White, for bringing to my attention a recent article by MacCready and Crowe, which covers the subject of tuberculosis of the tonsils and lymphadenoid tissue of the nasopharynx. They review the literature quite thoroughly and their own statistics are based on routine microscopic examinations of all adenoid and tonsillar tissues removed at the Johns Hopkins Hospital since 1912.

Out of a total of 3,260 examined, 138 or 4.18 per cent showed tuberculosis of the tonsils or adenoids and was four times as common in colored as in white persons, and 85 of the series had tuberculous glands of the neck and 48.2 per cent of these showed tuberculous lesions in the tonsils or adenoids. These authors are in substantial agreement with Mitchell in England, and Parks and Krumwiede in New York, that this type of microscopic lesion is of bovine origin and that gross ulceration of the tonsil is practically always secondary to pulmonary tuberculosis, the former being largely based on the fact that over 50 per cent of these microscopic lesions are in persons under 10 years of age and further they believe that it is not advisable to alarm the family and stigmatize as tuberculous the patient by telling them of the character of these minute lesions since the majority of such patients will probably never have clinical symptoms of the disease.

The patient, a man aged 36 years, steamfiitter's helper by occupation, came to Dr. MacKenty's clinic at the Manhattan Eye, Ear and Throat Hospital nine weeks ago complaining of pain for the month previous on the left side of his throat in the region of the left tonsil, aggravated

by swallowing and attended with some cough of a slightly productive character and some loss of weight.

No history of tuberculosis in the family. He had measles, whooping cough and diphtheria in childhood, but nothing since till onset of present illness.

On admission the left tonsil was the seat of a deep punched out ulcer with smooth margins and moderately indurated borders, but gave the impression of being limited by the capsule and noninfiltrating. The appearance was very much that of the tonsillar fossa four or five days after enucleation with a part of the tonsil left at the lower pole. Cultures taken were negative for diphtheria bacilli, but showed streptococcus mitis, staphylococcus albus and micrococcus catarrhalis. Smear was negative for the fusiform bacillus and spirillum of Vincent. Section removed from margin of ulcer showed hyperplastic lymphoid tissue with numerous miliary tubercles containing multinuclear giant cells and areas of caseation necrosis.

Diagnosis: Tuberculous lymphadenitis.

The Wassermann reaction was negative. Physical examination of the chest showed diffuse areas of subcrepitant rales with slight changes in resonance, breath sounds, and voice. Diagnosis: Diffuse pulmonary tuberculosis.

X-ray plates of chest showed diffuse infiltration of lungs, suggesting tuberculosis.

Sputum: Films contain numerous tubercle bacilli. Cultures made from sputum show profuse growth of a long chain hemolytic streptococcus and the staphylococcus albus. The temperature varied between 98 and 100° F. The pulse was correspondingly increased.

He was placed on a high calorie diet, including four quarts of milk daily, also eggs and other nutritious food. Malt extract and cod liver oil, one tablespoonful three times a day, was prescribed, also hygienic and sanitary precautions were enjoined.

Topical applications of weak silver and iodin preparations were applied to the ulcer. He has had two transfusions of 600 c.c. each. Since starting treatment he has gained thirteen pounds in weight, feels and looks better, is stronger, has less pain and cough, and the ulcer, although about the same size, shows a tendency to heal in places.

Reference: P. B. MacCready and S. J. Crowe, *Am. J. Dis. Child*, 27: 111, Feb., 1924.

Partial Resection of Maxilla for Carcinoma. Dr. Gouverneur M. Phelps.

The patient was an Irish girl, age 29 years, whose family history was irrelevant. In September, 1923, she had a submucous resection performed, and this was followed by a septal abscess. On June 13, 1924, she was seen in Dr. Harmon Smith's clinic suffering with nasal obstruction on the left side, accompanied with a foul discharge. Examination showed a large soft growth, filling the left side of the nose and nasopharynx. X-ray examination showed the left frontal sinus to be of average size, with severe involvement; the left ethmoids and antrum were also severely involved. The right frontal, ethmoids and antrum were involved mildly. The sphenoids were clear. The condition was reported to be a chronic polypoid sinusitis. On June 18, a section of the tumor was reported to be adenocarcinoma. The Wassermann reaction was negative.

On July 2, the patient was operated upon under gas and ether anesthesia: The upper jaw was partially resected, and the ethmoids and sphenoids were removed together with a large mass of soft growth. The outer wall of the antrum and the floor of the orbit were not removed. The carotid artery was not ligated. The hemorrhage was slight and easily controlled by packing. The wound was packed with 1 per cent formalin gauze, and the skin was closed with horsehair.

On July 10, 50 mg. of radium were inserted into the left nostril for sixteen hours. In all, the patient had six applications of radium, this

being inserted in the nostril, on face, and in the submaxillary triangle of the neck.

The tumor removed proved to be adenocarcinoma, very cellular, with active mitosis.

DISCUSSION.

DR. G. A. ROBINSON said the best way to make the application of radium in this type of case is after the removal of the growth. A preliminary irradiation may be advisable to restrain the growth and to lessen the hemorrhage by the effect on the blood vessels. Radical removal of a carcinoma of the antrum followed within a few days by thorough irradiation will give the best end results.

DR. VOISLAWSKY congratulated Dr. Phelps on the beautiful results obtained, and then inquired concerning the statement made that there was not much bleeding. Dr. Voislawsky said that he himself had always had a good deal of difficulty with the bleeding in such cases, and he hoped that Dr. Phelps be a little more explicit in stating why he did not ligate the carotid any more "on account of infection".

DR. WHITE said that he also had been impressed with the fact that Dr. Phelps did not ligate the carotid. In the last case of the kind operated at the Manhattan Eye and Ear Hospital, he did not ligate, although the ligatures were put *in situ* in the wound so that in case of hemorrhage it could be ligated promptly. The ligatures were removed a day or two after the operation, and there was no more disfigurement than with the ordinary incision.

DR. PHELPS, replying to Dr. Voislawsky, said the cases bleed freely but never dangerously; the danger was not very great, and if you want to control it you would have to tie both sides. The wound is infected from the one above by way of the lymphatics, and after the neck wound is apparently healed, it often opens and drains pus, and leaves a disfiguring scar, and it always takes longer to heal than the wound in the face.

Tuberculosis of Nasopharynx. Dr. Gouverneur M. Phelps.

The patient was a young woman from Dr. Harmon Smith's clinic who was operated upon on Sept. 15 for a mass of what clinically was considered to be tuberculous glands of the neck. This was proved by pathological examination. As she had large and diseased tonsils and a very large adenoid, she was advised to return later and have these removed. The lungs were clear, and the Wassermann reaction was negative.

On Dec. 1, under general anesthesia, the tonsils were removed, and at the same time what seemed to be an ademoid proved to be a large hard mass filling the nasopharynx. This was movable on the deeper structures, and was readily removed by sharp dissection.

Dr. Phelps said he considered the nasopharyngeal lesion to be the primary one, since it was typical of an old and healing lesion, while that of the neck was an extending and breaking down one.

DISCUSSION.

DR. HARRIS told of a case reported from Dr. Chappell's clinic some years ago, a case of primary tuberculosis of the nasopharynx, and said he was interested to know whether Dr. Phelps regarded this as a primary case.

DR. HOWARD inquired whether the patient had any tuberculous infection in the tonsils.

DR. WHITE said that sometimes an inordinate hemorrhage occurs after an adenectomy and at other times there is practically no hemorrhage at all. Recently a case in which apparently a severe hemorrhage occurred after adenectomy, a postnasal plug was used and left *in situ* for a very long time. The patient came to the Manhattan Eye, Ear and Throat Hospital and is still there suffering from acute mastoiditis and complications, but improving.

DR. HAYS said that primary tuberculosis of the throat, particularly ulceration of the tonsils, was extremely uncommon. The point that impressed him most was the necessity for differentiating the various

types of ulcers seen on the tonsils; it was surprising to note how many mistakes are made in them. The same might apply to tumors of the nasopharynx. Often when operating for adenoids one encounters soft tissues that might be the site of some pathological condition in the nasopharynx. He had seen two cases recently, neither of which was tuberculous. One of them had been treated by a prominent laryngologist for diphtheria for two weeks, although no bacilli were found. This patient had an ulcer looking very much like the one shown this evening, and it was a question whether it was tuberculosis, syphilis, or a malignant condition. Finally a four plus Wassermann reaction showed it to be syphilis. The other case was also very interesting. The laboratory reported the Wassermann reaction to be negative; the biopsy specimen was reported not malignant. It was a question whether it was tuberculous or not, although no tubercles or giant cells were found. Fortunately the patient had a relative who was a doctor, and another examination blood test was made, which was reported positive. So when one gets a negative report and cannot find definite evidence of tuberculosis, it is well to have a second Wassermann test made.

Dr. White said that the remarks made in regard to these conditions were very important, for every once in a while a disagreeable situation arises. This patient had been under treatment and a complete tonsillectomy had been performed before coming under my care. The adenitis was bilateral. There was nothing to show the cause—nothing in the teeth, no ulceration in the pharynx or nasopharynx. A Wassermann test was suggested, and there was the usual scene, and protests, but he insited that if he was to treat the case the patient must have the test made, and the report came back four plus. Such cases often fall into the hands of men who remove the glands, but that does not relieve the underlying cause.

Dr. Phelp: said that as soon as the mass in the neck was opened, a quantity of caseous material was evacuated, and the rest of the glands showed yellow foci scattered through them. The tonsils were examined and were not tuberculous. Many years ago in the Roosevelt Hospital Dr. Hodeuful and himself had sanctioned a thousand tonsils, to find out how often tuberculosis was present ,and in that number only twelve were found and these all had tubercular glands of the neck positively diagnosed. That was before the Wassermann test was used. This girl apparently had a pharyngeal lesion that was apparently a primary one, for it was in a very fibrous stage.

As to the ligation of the carotid, Dr. Phelps said that he had done two resections of the jaw in which he had ligated, and one evening at the Academy he had listened to some cases reported from a general surgical clinic, and the question of ligation came up, and the consensus of opinion was that the extra time, loss of blood, mutilation, and danger of subsequent infection in the neck wound did not warrant the ligation or even the section of the neck.

With the compression of the carotid, accordingly the next time he had a suitable case he had omitted the ligation and found it very satisfactory. (Described the method used.)

The suction apparatus was used, as in tonsil cases, and the head was kept way back. The best way is to put the tracheal tube in the larynx and pack it; that makes it very much safer. Then, in cleaning it out, he used moistened gauze, dipped in 1 per cent formalin, leaving it in place while the operation was proceeding until he was ready to remove it; later the whole thing was packed solid with 1 per cent formalin gauze. This was removed after forty-eight hours, and it was perfectly sweet. He knew of no other method which would give so satisfactory a result.

Dr. White said that in the case he had referred to he had used hot sterile saline solution only—no formalin.

Dr. Howard said that when the patient first presented himself tuberculosis was not seriously thought of. The slight induration suggested the possibility of epithelioma, and a section was removed for examination, which proved to be tuberculous.

Case of Hodgkin's Disease Involving the Nose and Throat and Showing Radium Burn, Now About Healed. Dr. T. J. Harris.

This little patient has been presented before and is now presented again with reference to a complication encountered, a radium burn following the application of radium in the throat. She is 13 or 14 years of age, born on the other side and has been living in this country for two or three years. A year after she arrived she developed a soreness of the throat with swelling, and she went to the pediatric clinic at the Post-Graduate Hospital, where radium was applied, followed by disappearance of the swelling. I did not see her at that time.

Six months later she came to the Throat Clinic complaining of nasal obstruction and total inability to breathe through the nose, the obstruction being more marked on the right side. In view of the bleeding and the age, the picture was diagnosed as a case of sarcoma. A biopsy was made, and the report came back not sarcoma but malignant lymphosarcoma. Feeling somewhat doubtful, and there being complete darkness on the right side of the face with the X-ray showing involvement on that side, the antrum was explored but was found to be virtually negative. Later, under general anesthesia, the tissue on the right side of the nose was removed as thoroughly as possible, but not completely so; the growth was again submitted to microscopic examination and the earlier report was confirmed; *i. e.*, Hodgkin's disease. A third operation was then performed, and the growth further removed and radium applied in the nose at least three times, with no reaction whatever. The case was seen by the medical men, who also made the diagnosis of Hodgkin's disease.

There was absolutely nothing in the throat, and until this fall no appearance of any growth in the throat was manifest, when I discovered a large mass on the posterior pharynx wall rapidly extending to the left side. The mass consisted of soft tissue, not bleeding easily, and was beginning to interfere materially with deglutition. In the light of the condition in the nose and the previous history of the growth in the throat there was little question in regard to the nature of the disease manifesting itself there. This seemed to be an admirable case for the application of radium, but instead of employing it as has been done on previous occasions, we made use of the radium emanations, 204 mc. hours (23 mg. something over eight hours).

When seen two days afterward, she complained of difficulty in swallowing, and examination of the throat showed a large ulceration over the whole area of the application of the radium and around it. This extended rapidly until the ulceration was about half an inch in diameter. Topical treatment was instituted; the pain was not complained of severely. At that time the burn seemed to be at its height, for it began to improve, and anyone looking at it now would have difficulty in determining where the burn was. The patient looks well, is feeling well, and is swallowing well.

There has always been difficulty in confirming the microscopic and medical diagnoses from the findings in the nose and throat, for the patient is so well and continue to be so. The case is presented with especial reference to the liability of burns from radium emanations. I have inquired about this from those who know and have been told that such burns are occurring all the time, and that others are making the same mistake that we made, using it in the same strength as the radium salt. As one specialist said: it is at least four times as powerful as the radium salt and should therefore be used four times as weak. It was used in this case as the salt is used, burying the needles. The case is presented with the hope of forestalling or saving others from the same unpleasant experience, which fortunately, did not give as serious results as was at first feared.

Septicemia Following Furuncle of the Nose. Dr. T. J. Harris.

I should like also to report briefly another case which I hope to report later in full.

The patient is a young girl who developed in the right ala an ordinary furunculosis, with swelling and pain. At the end of three or four days she went to a local physician, who did what is so common—incised it, expressed the purulent matter, and sent her home. The third day following she developed a temperature of 104-5,° and was referred to the hospital. When admitted, she had a temperature of 105,° and was rather flighty, suggesting the possibility of meningitis, with some swelling and redness above and below the right eye. Dr. Forbes saw the case for me and immediately curetted the incision into the cheek and drained the nose as thoroughly as he could. At first the blood was absolutely free—no organism could be found—and it must have been fully a week before a staphylococcus was found in the blood. In the meantime pointings were found above and below the eye and in the cheek; and during the time she was in the hospital she must have had a dozen incisions in and around the cheek for drainage. and metastases occurred in the ankle without drainage; she developed a septic pneumonia and a septic heart. Her life was saved, as all agreed, in spite of the fact that she had two transfusions, by the free use of mercurochrome, four injections in all. According to the recommendation of Hugh Young in his article in the *Jour. A. M. A.*, last spring, we used it intravenously, giving 23 per cent of the body weight of a 1 per cent solution. She had 26 c.c. each time. The medical men were very chary of using it, being particularly afraid of the risk of an acute nephritis. The urine was watched carefully, and there was never a trace of albumin in it. Immediately following the use of mercurochrome there was a favorable response, and the blood would clear up; as soon as it became septic again the mercurochrome was repeated. We fought it and fought it, and kept on draining out the areas of pus, which fortunately were superficial. Finally, in spite of our fears of meningitis, and cavernous sinus thrombosis, etc., we avoided all such complications and the patient was discharged two or three weeks ago, after nearly two months in the hospital.

This case illustrates the imminent danger of meddling with a furuncle of the nose. The anatomical conditions are well known, the absence of valves in the veins, the direction of the blood supply, and the opportunity thus of the injection getting up into the brain. There are probably more cases of the kind than we have any idea of, and doubtless many cases of sinus thrombosis develop from such conditions. The general surgeons say that squeezing and pressing in such cases is contraindicated. If you have a desperate case of septicemia, where blood transfusion does not do all you wish, do not hesitate to use mercurochrome. The use of the two together is not contraindicated.

DISCUSSION.

Dr. Hays said that such a case should not be allowed to pass without comment, but he had been wondering whether or not the result secured would be permanent. The treatment was exceedingly interesting. The case brought up one very important point: how often cases are observed from only one standpoint, without thinking that the condition treated might be part of a general condition, as a leukemia, for instance. It is very infrequent for a specialist to have a blood count taken. Also, when one finds palpable glands in the neck which suggest possible conditions in the nose, one should examine the axillae, etc., and find out whether other glands are involved.

Dr. Hays said that a case of this kind was of particular interest when recalling the remarks of Dr. Gordon New at the recent Congress of Surgeons. in telling of cases where the glands of the neck were operated upon by the general surgeon without investgating the nose and throat conditions—the glands were removed. and that was the end of it. so far as the surgeon was concerned; it took the nose and throat men to find out that was a malignant condition of the nasopharynx. Cases of this type should make one look carefully into the general condition.

To be Continued.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

SOME NEW METHODS AND APPARATUS FOR TESTING THE ACUITY OF HEARING AND THEIR RELATION TO THE SPEECH AND TUNING FORK METHODS.*

DR. HARVEY FLETCHER, New York.

There may be some otologists who believe there is not much to be gained by making tests of the acuity of hearing. They see in such measurements little value for clinical purposes, but since a considerable portion of the program for this session has been devoted to this subject I shall assume that the majority of those present believe that some sort of acuity tests is not only worthwhile but very important.

The kinds of hearing tests that are needed may be classified into four groups according to their purpose as follows:

1. *Industrial* or those made for determining the fitness of a candidate for employment. In certain types of work it is particularly important that a prospective employee meet a definite requirement for acuity of hearing. Tests made in the army and navy for various branches of service are conspicuous examples of this kind of test.

2. *Educational* or those made for determining the degree of hearing of school children both in the public schools and in the schools for the deaf for the special purpose of determining the proper methods to be used in their education.

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*Lecture and demonstration before the American Otological Society in Washington, May 5, 1925.

From the Bell Telephone Laboratories, Inc.

3. *Clinical* or those made for assisting the doctor to make a proper diagnosis of the cause of deafness.

4. *Research* or those made to determine new facts about both normal and abnormal hearing.

It is evident that different methods are appropriate for these different purposes. Unless the particular purpose is kept in mind there is apt to be confusion when discussing the merits of a method of testing hearing.

It is highly desirable that a single scale be used for representing the degree of hearing which is independent of the method used, and which has a general application to all the purposes mentioned above. Therefore, before describing the apparatus developed for making hearing tests for these various purposes, I desire to describe the scale of hearing which is now being used by a number of otologists, which may be used for all these purposes, and show how the results obtained from the commonly made voice test, watch tick, acoumeter, coin click, and tuning fork tests can be expressed in hearing loss units on this scale.

NEW SCALE FOR MEASURING THE ACUITY OF HEARING.

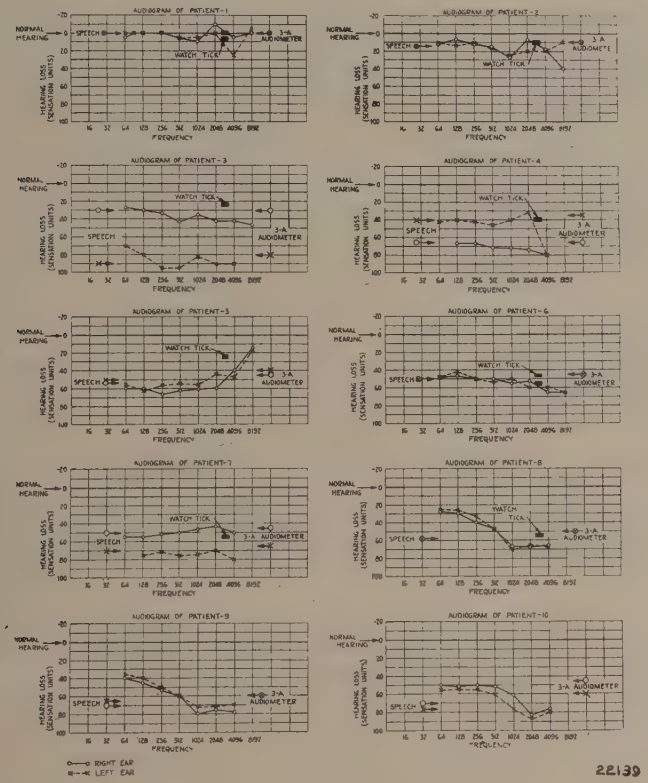
This scale for measuring hearing has been described in a paper given before the Franklin Institute (Physical Measurements of Audition, September, 1923). It is the one indicated on all the audiometers made by the Western Electric Company. It is important to notice, however, that the use of this scale is in no way dependent upon the use of audiometers of this kind. A change in the intensity in the ratio of 10 to 1 corresponds to an increase of 10 units on this scale—no matter what the initial intensity may be. For example, if the initial intensity is 1, then for an increase of 10 units the intensity becomes 10. For another increase of 10 units or a total of 20 the intensity becomes 100. For still another increase of 10 or a total of 30 units the intensity becomes 1000. It is a psychological fact that the sensation increase produced when the intensity changes from 100 to 1000 is the same as when it changes from 1 to 10. It is for this reason that the proposed units are called Sensation units.

One of these sensation units corresponds to a fractional change in the intensity which is approximately the smallest that the average ear can detect. These same units are used in telephone engineering and when so used are called transmission units. They are used to describe the change in loudness of the sound issuing from the telephone receiver due to any changes in the transmission circuit.

The hearing loss H.L. in sensation units is defined mathematically by the equation

$$\text{H.L.} = 10 \log \frac{I}{I_0}$$

where I and I_0 are the intensities which the sound must have to be just audible to the person being tested and to a person of normal hearing respectively. In other words it is the number of sensation units below the normal hearing intensity.

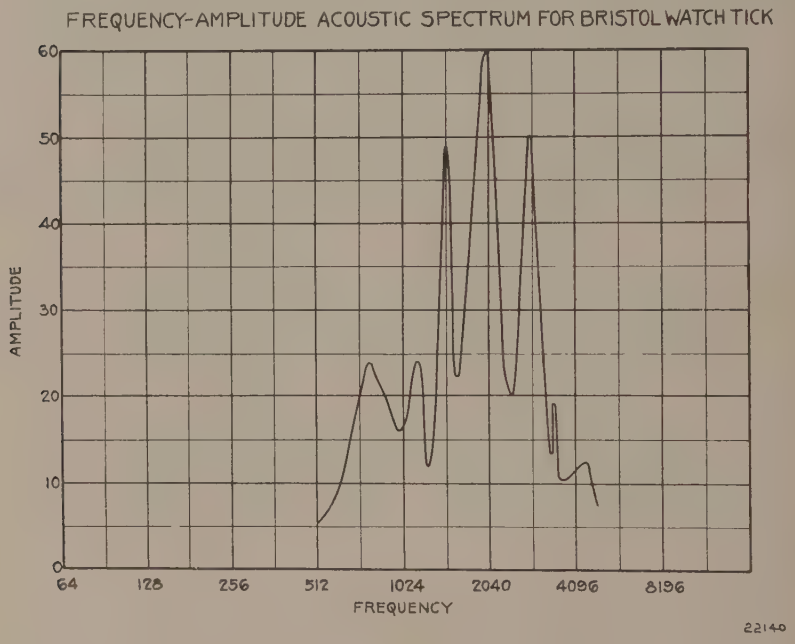


In a paper presented before the American Triological Society by Fowler and Wegel (Audiometric Methods and Their Applications, May, 1922) a hearing scale was proposed which has been objected to by some otologists because it is dependent upon the threshold of feeling as well as the threshold of hearing. On this scale the per cent hearing loss is the hearing loss in sensation units divided by the number of sensation units between the threshold of hearing and the threshold of feeling for an average normal ear. It is un-

doubtedly the best answer to the practical question as to what is the per cent hearing loss, and is very useful in expressing general results. It is particularly useful for describing to the patient his degree of hearing. However, for most other purposes it seems desirable to express results in terms of sensation units rather than per cent hearing loss.

CONVERSION OF HEARING LOSS IN SENSATION UNITS TO PER CENT HEARING LOSS.

The hearing loss expressed in sensation units can be converted into per cent hearing loss by multiplying the former by a factor K



which varies with the type of sound used in the test. It is obvious from the definition given above that this factor is equal to 100 divided by the number of sensation units between the normal threshold of hearing and the normal threshold of feeling for the particular sound used. Experiments made in the Bell Telephone Laboratories have indicated that for speech this factor is .83; for the test tone of the 3-A audiometer it is equal to 1.0; for a watch tick, coin click, or acoumeter it is approximately 1.5. For pure tones the value of K is dependent upon the pitch and is given in Table I. The question marks indicate that the value of K for tones having either 32, 48 or 12,800 vibrations per second are not accurately determined.

RELATIONS BETWEEN SENSATION UNITS HEARING LOSS AND THE MAXIMUM HEARING DISTANCES FOR SPEECH.

Let us now consider the relation between the hearing loss expressed in these sensation units and that expressed in the usual voice test method. If the room in which such tests are made is acoustically treated so that no sounds are reflected from the wall, ceiling, or floor, then the intensity of the sound decreases as the inverse square of the distance. In a room with numerous drapings and a heavy carpet this condition is approximately fulfilled. Tests in our laboratory have indicated that for an average speaker calling numbers with an intensity corresponding to the musical notation MF (mezzoforte) into a normal ear at a distance of 1½ inches

TABLE I.

FACTORS FOR CONVERTING HEARING LOSS EXPRESSED IN SENSATION UNITS INTO PER CENT HEARING LOSS.

Vibration Frequency	K	Vibration Frequency	K
32	3.3 (?)	800	.77
48	2.2 (?)	1024	.76
64	1.5	1600	.77
100	1.28	2048	.77
128	1.09	3200	.81
200	.96	4096	.86
256	.91	6400	.94
400	.83	8192	1.22
512	.79	12800	1.42 (?)

the intensity is 90 SU (Sensation Units) above the normal threshold of audibility. Also, these tests have shown that this intensity is 80 SU above the intensity necessary for a 50 per cent correct interpretation of called numbers. For a voice corresponding to PP (pianissimo) the sensation level is about 15 SU lower and for a voice corresponding to FF (fortissimo) about 15 SU higher. About the same results are obtained when using either a PP voice or a loud whisper. An average whisper is about 15 SU lower than a loud whisper.

Using these data, the inverse square law, and the definition of hearing loss given above it is possible to calculate for each intensity of calling the maximum distance for hearing and interpreting called numbers by a person of known hearing loss. The necessary equations for doing this are developed in Appendix A. In this appendix it is also shown that the maximum distance which the normal ear can interpret called numbers is 40 feet for the average whisper, 222 feet for the loud whisper or PP voice, 1250 feet for the MF voice, and 1⅓ miles for the FF voice. At first thought these num-

bers seem to be unreasonably large to conform with our every day experience, but it must be remembered that we are usually immersed in a continuous noise. This is especially true in the large cities. One needs only to recall the common experience while in the country on an early morning of hearing the cock crow and other familiar sounds at a distant farmhouse to realize that the voice will reach these long distances in a very quiet place.

In the usual office in the city the noise is sufficient to shift the threshold of hearing 20 or 30 sensation units without causing any annoyance. The hearing distances corresponding to the four intensities of the voice which would be obtained in such an office might be as small as 15 inches, 7 feet, 40 feet, and 222 feet instead of the larger distances given above. Therefore, it is seen that a speech test made in such an office would not differentiate between ears that are normal and those having a 30 SU loss in hearing.

The maximum distances which persons having different amounts of hearing loss can interpret these four intensities of voice were similarly calculated and are given in Table II.

TABLE II.

MAXIMUM DISTANCES IN A QUIET PLACE FREE FROM REFLECTIONS FOR INTERPRETING SPEECH BY PERSONS HAVING VARIOUS AMOUNTS OF HEARING LOSS.

Hearing Loss Sensation Units	Average Whisper	Loud Whisper or PP Voice	MF Voice	FF Voice
0	39.5 Ft.	222 Ft.	1250 Ft.	1 1/3 Mi.
5	22.2 "	125 "	704 "	3950 Ft.
10	12.5 "	70 "	395 "	2220 "
15	7.0 "	39.5 "	222 "	1250 "
20	4.0 "	22.2 "	125 "	704 "
25	2.2 "	12.5 "	70 "	395 "
30	15 In.	7.0 "	39.5 "	222 "
35	8.5 "	4.0 "	22.2 "	125 "
40	4.7 "	2.2 "	12.5 "	70 "
45	2.7 "	15 In.	7.0 "	39.5 "
50	1.5 "	8.5 "	4.0 "	22.2 "
55	.8 "	4.7 "	2.2 "	12.5 "
60		2.7 "	15 In.	7.0 "
65		1.5 "	8.5 "	4.0 "
70		0.8 "	4.7 "	2.2 "
75			2.7 "	15 In.
80			1.5 "	8.5 "
85			0.8 "	4.7 "
90				2.7 "
95				1.5 "
100				0.8 "
110		May be reached by speaking tube		
115				
120		Totally Deaf		

It is generally recognized that it is almost impossible to obtain accurate results by means of the usual speech methods because of

the uncertainties of controlling the intensity of the voice, and the noise and acoustic conditions of the testing room. However, for rough work these tests are useful and this table should aid in the interpretation of the results obtained from such tests. It is evident that there are two ways of varying the intensity of the speech sounds arriving at the ear of the patient, namely, by varying the intensity of calling and using a fixed distance or by varying the distance and using a constant intensity of calling. When the first method is used it is seen from Table II that if the tester calls at a distance of 15 inches and the patient cannot interpret an average whisper his hearing loss is greater than 30 SU; if he cannot interpret a loud whisper or PP voice, it is greater than 45 SU; if he cannot interpret a MF voice, it is greater than 60 SU; and finally, if he cannot interpret a FF voice (shouting intensity), it is greater than 75 SU. It is thus seen that a rough measurement of the hearing loss in sensation units is obtained by simply varying the intensity of calling at a given distance.

Probably more accurate results can be obtained by varying the distance using a constant intensity of voice. For distances smaller than 6 inches the results will be unreliable due to the uncertain reflections between the head of the listener and the head of the speaker and the difficulty of making accurate measurements of the distance. This limits the maximum loss of hearing that can be measured by this method. The noise conditions and extreme distances limit the minimum loss that can be measured. For an average whisper this practical range is from a hearing loss of 40 to 20; for the loud whisper or PP voice from 55 to 20; for the MF voice from 70 to 30; for the FF from 85 to 45; the noise conditions limiting the lower value in the first two cases and the size of the room in the last two. When a greater accuracy than 10 or 15 SU is desired it is necessary to calibrate the voice rather than rely upon the tester's judgment as to which intensity of voice he is using. This is done by determining the normal hearing distance or its equivalent for the particular intensity used. A method of doing this is given in Appendix C where it is shown that the hearing loss can be obtained by subtracting two values Y_0 and Y obtained from a curve corresponding to the hearing distance for the normal ear and the ear of the patient respectively. Since the normal hearing distances are so large indirect means must be used in their determination except for intensities smaller than the average whisper. By combining both methods a fairly large range of hearing can be covered. It depends, however, upon the ability of the tester to

change accurately the intensity of calling from one type to the other, an accomplishment that is seldom realized.

When this method is used by a tester who is somewhat overanxious that the patient show an improvement in hearing it might give quite erroneous results. If he should use the PP voice and find the hearing distance one foot before treatment, and then in the test after treatment, in his anxiety, raise the intensity of his voice to that corresponding to MF, he would find the hearing distance had increased to five feet even though there was no change in the patient's ability to hear. The increase from 1 to 5 feet would sound like a big improvement to the patient.

As shown in Appendix B for the same patient *an improvement in hearing of one foot for an average whisper is the same as an improvement of 5½ feet for the PP voice, 32 feet for the MF voice, and 178 feet for the FF voice.* Equation 1 of Appendix B shows that if the hearing distance is expressed as a fraction of the normal distance this fraction will be the same for all intensities of voice used. This shows that the common practice of giving results of voice tests as fractions of the normal distance has a logical basis. As will be seen later there is no such logical reason for expressing the results of tuning fork tests as fractions of the normal time. As indicated in Table II the intensity range of hearing is 120 SU corresponding to a distance variation of one million to one. The range from 0 to 60 SU loss or 50 per cent loss for speech corresponds to a distance variation of one thousand to one. This emphasizes the fact that variation of distance alone is entirely inadequate to cover the complete intensity range for hearing.

REDUCTION OF WATCH TICK, ACOUMETER, AND COIN CLICK TESTS TO SENSATION UNITS HEARING LOSS.

The results of watch tick tests can be reduced by the method outlined in Appendix C. In this case, however, reflections from objects in the room, especially from the head of the patient produce very marked irregularities. This is due to the fact that the components of sound from the watch are mostly in the high frequency region around 2000 vibrations per second. At such high frequencies more definite reflection patterns are produced by the objects in the room than for the low frequencies. The dotted curve in Fig. I of Appendix C shows a reduction curve which was determined experimentally for a watch tick and illustrates very well the irregularities which commonly exist in a room even when well damped. The solid curve is based on the inverse square law. In Fig. 2 is shown the relative amplitudes of the component frequencies in a

watch tick sound. From this it will be seen that the watch tick is essentially a test of acuity for frequencies in the neighborhood of 2000 vibrations per second. The loudness of several types of watches when held in contact with the ear was determined to be in a range from 40 SU to 70 SU above the threshold of audibility. An average for good grade watches is 45 sensation units. This means that a patient who can just hear such a watch tick has a 45 SU hearing loss for frequencies near 2000 vibrations per second.

The results of acoumeter or coin click tests can be reduced in the same way. They are open to the same objections as mentioned for the watch tick. This test is also essentially a test for high frequencies.

REDUCTION OF RESULTS OF TUNING FORK TESTS TO SENSATION UNITS HEARING LOSS.

In the standard method for determining the acuity of hearing at different pitches use has been made of a series of tuning forks having various vibration rates through the audible range. The fork is given a standard blow of some sort to set it into vibration. It is then held as close to the ear as possible, preferably with the flat part of the prong directly facing the auditory meatus. The time t in seconds from the striking of the blow until the patient no longer hears the sound is observed. A comparison of this time to that t_0 required for normal hearing gives a measure of the hearing by air conduction. It is shown in Appendix D that the hearing loss H.L. in sensation units is given by

$$\text{H.L.} = \triangle (t_0 - t)$$

where $\triangle$ is a constant of the fork depending upon the amount of damping. In other words the hearing loss in sensation units is obtained by multiplying the decrease in time for air conduction by a constant of the fork. If it is desired to reduce the results to per cent hearing loss the following relation is used

$$\text{Per Cent Hearing Loss} = K\triangle (t_0 - t)$$

the factor $K\triangle$ having a definite numerical value for each fork used. For illustrating the kind of constants one might expect to obtain the values of $\triangle$ for three groups of tuning forks are given in Table III. For convenience the values of K from Table I are also given. The first group of forks are from a set used in the Bell Telephone Laboratories. The second set was loaned to us by Dr. E. P. Fowler. The last fork is a 500 cycle standard fork used by Dr. Douglas MacFarlan.

For example, when Dr. Fowler's 256 fork is used the per cent hearing loss is given by

$$\text{Per Cent Hearing Loss} = 1.25(70 - t)$$

where t is the air conduction time for the patient. It is evident from the formula that if a person does not hear the fork at all, he must have more than 87½ per cent loss.

TABLE III

TYPICAL CONSTANTS FOR TUNING FORKS.

Rate in dv	Dampening Δ Expressed in SU per second	Time t_o in seconds for Normal Air Conduction	Factor K for Reducing Hearing loss to % Hearing
	Bell Telephone	Laboratories' Forks	
24	.30	75	4. (?)
48	1.9	51	2.2 (?)
64	1.61	41	1.5
100	1.75	30	1.28
200	.93	110	.96
400	.46	140	.83
500	.59	135	.81
800	.87	112	.77
1000	1.19	71	.76
1200	1.14	69	.76
1800	2.29	44	.77
2000	2.41	45	.77
	Dr. E. P. Fowler's Forks		
128	1.08	65	1.09
256	1.38	70	.91
512	1.31	95	.79
1024	1.70	40	.76
2048	2.17	20	.77
	Dr. D. MacFarlan's Standard 500 Cycle Fork		
500	2.0	55	.81

It is useful to know (See Appendix D) that if the hearing loss of the tester is known, then the hearing loss of the patient can be found as follows: Set the fork into vibration by any means not necessarily using a standard blow, hold the fork to the patient's ear in the standard fashion. Start the stop watch when the patient signals he no longer hears the tone. Hold the fork to your own ear in the same standard way, stop the watch when you cease to hear the tone. Then the reading of the watch in seconds multiplied by the constant of the fork Δ gives the difference in sensation units between your hearing loss and that of the patient.

This method has the advantage that the results are not dependent upon the initial blow given to the fork, but it has the disadvantage that it depends upon the hearing of the tester and any noise in the

room affects the hearing of the tester much more than that of the patient provided the former is much more acute than the latter.

For example, suppose that you know that the tester's hearing loss is 20 SU at 2048 vibrations per second, and also when using the technique described above and Dr. Fowler's 2048 fork the time difference is found to be 48 seconds. Then, the hearing loss of the patient is

$$1.70 \times 30 + 20 = 71 \text{ SU}$$

or his per cent hearing loss is

$$71 \times .77 = 55\%$$

It would be a great advantage to those who use tuning forks if the makers of such forks for otological purposes would furnish values of the damping constants as well as the frequency of vibration: then the results of tuning fork tests could be reduced to a common basis as indicated above.

From the relations given above it is evident that the common practice of giving the results of tuning fork tests as fractions is not a rational one. Two such fractions that are equal do not indicate at all that the hearing losses corresponding are equal. For example suppose a man having 60 SU loss in hearing were tested first with the 500 fork of the Bell Telephone Laboratories' group and then with Dr. MacFarlan's fork. In the first test the hearing time for the patient would be 33 seconds and in the second 25 seconds. Expressed as ratios in the usual way these give 33/135 or approximately ¼ and 25/55 or approximately ½. By giving just these two ratios one would never guess that they referred to the same hearing loss. However, if they are reduced to sensation units as outlined above, it will be found that a 60 SU hearing loss is obtained from both tests. Or, again if the 100 cycle and the 2000 cycle forks were used and the hearing times found to be 10 and 15 respectively, expressed as ratios of times the hearing loss would be ⅓ in each case, but the ability to hear these tones is vastly different the hearing loss for the first being 35 SU and for the second 72 SU.

NEW INSTRUMENTS AND METHODS FOR DETERMINING DIRECTLY THE HEARING LOSS IN SENSATION UNITS.

In order to increase the accuracy and speed of making hearing tests which are equivalent to those which have been described and for the purposes outlined at the beginning of the paper, the Bell Telephone Laboratories have developed several pieces of apparatus which I wish to present for your consideration. For making speech tests a phonograph type of audiometer has been developed. In this

instrument records which have been made by special electrical processes are used for producing the speech sounds. This insures a definite volume of voice so that accurate comparisons are possible. The recorded speech sounds are transformed into their electrical equivalent by means of an electromagnet reproducer. The electrical waves thus created are carried by means of wires to a receiver which is held to the patient's ear. The intensity of the sound sent into the patient's ear is controlled by resistances in the electrical circuit. This phonograph type audiometer is furnished in three different forms according to the purpose for which it is to be used. For making a survey of the hearing of large groups to find those who have a deficiency for hearing speech it is furnished with the turntable unit, with special records upon which the recorded speech sounds continually decrease in intensity as the record revolves, and a unit containing 12 receivers. A master sheet is furnished which gives the hearing loss corresponding to 50 per cent failure to understand numbers pronounced with intensities equivalent to those produced by each number on the record. This form of phonograph audiometer requires no batteries or attenuators. (Demonstrated the use of this instrument by permitting 24 of the doctors present to listen to some of the records.)

For purposes of testing more accurately the hearing of one individual at a time an attenuator is interposed between the turntable unit and the receiver and a record is used which gives a constant speech intensity. For use in schools for the deaf or for testing patients who are very hard of hearing an amplifier unit which obtains its power supply directly from an AC lighting circuit can be furnished to be interposed between the turntable unit and the attenuator box. (Demonstrate the use of this instrument with a 25-A amplifier.) In each case the connecting cords are arranged so that the tester can also listen by means of an auxiliary receiver to the speech coming from the phonograph record. This phonograph type of audiometer can also be used as an auxiliary to either the 2-A or 3-A audiometer. When used in this way the hearing loss can be read directly on the audiometer dial. (Demonstrate its use on both the 1-A and 2-A audiometer.) With this instrument the speech intensities being delivered to the ear of the patient can be varied 10 billion fold by simply turning the dial from one end of the scale to the other corresponding to a distance variation of more than 100,000. This makes it possible to test ranges of deafness from zero loss to 100 SU loss or practically the entire range. Not only does it have this increased range over that obtainable in the ordinary

speech test, but it has a determinable intensity level for the speech and is not subject to variations in the acoustic properties of the room..

The 3-A audiometer which has been described before has been developed to take the place of such tests as the watch tick tests, the acoumeter tests, or those designed to make a very quick test of the general hearing level. In this instrument a tone having components throughout the entire speech frequency range electrically generated and delivered to a receiver to be held on the ear of the patient. The volume of the tone is controlled by the same attenuator unit as used

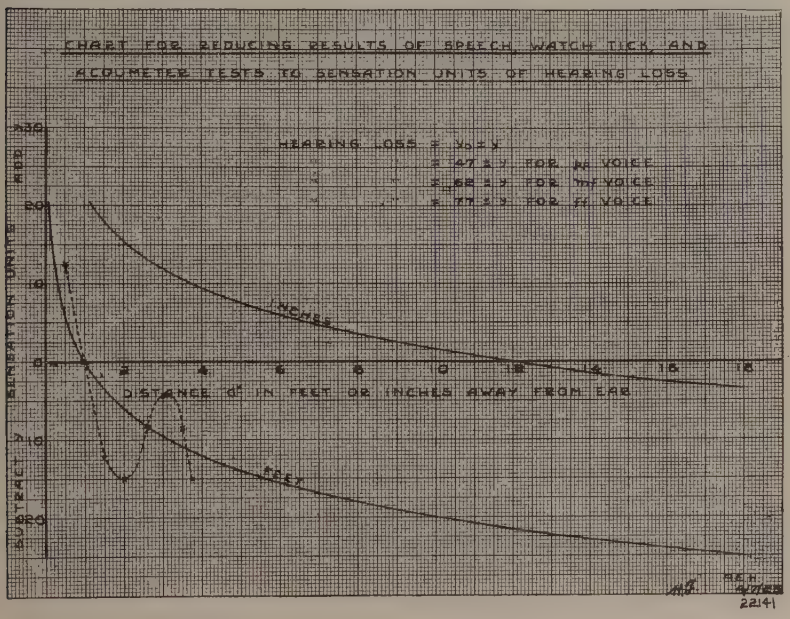


CHART FOR REDUCING RESULTS OF SPEECH, WATCH TICK, AND ACOUMETER TESTS TO SENSATION UNITS OF HEARING LOSS
HEARING LOSS = V0 - V
= 47 ± V FOR M VOICE
= 58 ± V FOR TH VOICE
= 77 ± V FOR F1 VOICE
NOISE
VOICE
DISTANCE d IN FEET OR INCHES AWAY FROM EAR
SENSATION UNITS OF HEARING LOSS
2214

in the other audiometers. It reads directly either in sensation units loss or per cent hearing loss since it was found for this tone that there were just 100 SU between the threshold of hearing and the threshold of feeling for the normal ear. This instrument has been found to be particularly useful in schools for the deaf. It enables the teachers to grade the degree of hearing of the child very quickly which aids them in deciding upon the kind of methods to be used in teaching him. It is also useful in making a quick test of the hearing of large groups when they are to be tested one at a time. (Demonstrate the performance of the 3-A audiometer.) This 3-A audiometer is also useful when testing a case of uni-lateral deafness for it can be used to produce a determinable amount of noise in the

good ear while testing the acuity of the bad ear by any of the methods outlined. For this purpose it is much superior to a device which produces only a constant level of noise because the intensity of the noise can be placed at just the proper level to sufficiently mask the hearing in the good ear without in any way interfering with the hearing in the bad ear. The proper level for doing this depends upon the relative amounts of hearing in the two ears. Those who believe an ear massage is of value may find that this instrument can be adapted to this purpose.

The apparatus which has been developed for replacing the tuning fork test is now quite well known. Several types of audiometers have been developed for this purpose. The two which have been developed by the Bell Telephone Laboratories and known as the 1-A and 2-A audiometers are here for demonstration. These two audiometers are devices for diminishing the intensity of the sound logarithmically to just the inaudible point exactly as the tuning fork is a device for letting the intensity fall off logarithmically in time to just the inaudible value. The 2-A audiometer has been designed for general practice and for this reason great stress has been placed on the convenience and simplicity of its operation. Eight tones spaced an octave apart in the frequency range from 64 to 8192 vibrations per second can be produced by throwing the appropriate keys on the keyboard of the audiometer. The attenuator scale is calibrated so that the hearing loss in sensation units is read directly from the scale when the dial is turned to the position corresponding to the threshold for the patient being tested. Audiogram blanks are furnished with the instrument which makes it possible to show graphically the hearing loss at each frequency. Already a number of doctors have changed the form of these blanks to fit their particular need, but of course have retained the same scale.

The 1-A audiometer is similar in principal to the 2-A audiometer but it has a much greater range in frequency and intensity. Both of these instruments are equipped with a jack so that auxiliary equipment may be used with them. It has been our experience that the doctor frequently desires to talk to the patient either before or during the time that the pitch range test is being made. For this purpose a talking set has been developed. By plugging the end of the cord of the talking set into the jack of the audiometer it is possible to talk directly to the patient through the receiver which he is using during the test. By turning the attenuating dial the volume of the speech thus delivered to the patient's ear can be varied in intensity from high values to the threshold of audibility. (Demon-

strate the use of this instrument on both types of audiometers.) Also, as mentioned before, the phonograph audiometer may be used as an auxiliary to both the 1-A and 2-A audiometers by plugging the cord from the turntable unit of the phonograph audiometer into the appropriate jack. Then, the speech waves coming from the phonograph record will be delivered directly to the receiver of the patient's ear. Its volume may be controlled by the attenuator dial. A mark on this dial can be determined so that readings on the scale from this mark will give directly the patient's hearing loss for speech.

In schools for the deaf and other places where large intensities are required and where the expense of a 1-A audiometer may not be justified, the intensities of the 2-A audiometer may be increased by adding the amplifier unit used in connection with the phonograph audiometer. This amplifier can be used with the 2-A audiometer by a very slight modification in the present type. Such an audiometer is available. (Demonstrated the use of the 25-A amplifier with the 2-A audiometer.)

For research purposes any or all of this apparatus might be used. It may be modified in a great variety of ways to suit the investigator. For example, three different types of pitch range audiometers have been discussed before this Society in which a continuous variation in pitch was possible.

It has been our opinion that except for special research work this is not necessary or even desirable. However, for those who like the other features of the 1-A audiometer and still want a continuous variation in frequency I will state that a standard Leeds Northrup condenser box can be connected into the circuit so that all frequencies besides those normally obtained can be produced. When the audiometer is thus converted a calibration curve is required for interpreting the results. (Demonstrated how this may be done.)

Comparative Results of Different Methods for Ten Patients.

In order to show comparative results obtained by different methods of testing, Table IV is given. It shows the results of tests on the hearing of ten persons by four different methods, namely, the phonograph audiometer, the 3-A audiometer, the standard speech test, and the watch tick test methods. Audiograms obtained by the 2-A and 1-A audiometers are given for these same people in Fig. 3. On these audiogram charts the hearing loss for speech and for the 3-A audiometer tone are shown at the left and right respectively.

TABLE IV.

I	II		III		IV	V		VI		VII
Ear Number	Distances for Interpreting Numbers Voice A Y-58	Voice B Y_0-65	Hearing Loss Cal. from II		Hearing Loss Phonograph Audiometer	Distances for Watch Tick Test A(Y_0-10)	B(Y_0-15)	Hearing Loss Cal. from V		Hearing Loss 3-A Audiometer
1–R	800 ft. (cal.)	1800 ft. (cal.)	0	0	0	40 in.	70 in.	0	1	0
1–L	"	"	0	0	0	20	36	6	5	0
2–R	140 ft. (cal.)	320 ft. (cal.)	15	15	15	10	31	12	7	10
2–L	"	"	15	15	15	15	64	8	2	10
3–R	20 ft.	20+ft. +	32	7	30	3	5½	22	22	30
4–L	3 "	6 "	48	49	35	–	1	—	39	35
5–L	1.7 "	3.7 "	53	54	45	2	4.5	26	23	40
5–R	1.8 "	3.7 "	52	54	50	3	6.5	22	21	45
6–L	2 "	3.5 "	52	54	50	–	contact		55	45
6–R	1.5 "	4 "	54	53	45	–	.5		45	45
7–R	.9 "	2 "	57	59	50	–	contact		55	45
8–L	1.2 "	3.7 "	56	54	60	–	–			50
8–R	1.2 "	3.7 "	60	54	60	–	contact		55	50
4–R	No test				65	–	–			65
9–L	8 in.	13 in.	62	64	65	–	–			60
9–R	5	8.5	65	68	70	–	–			60
7–L	8	15	61	63	70	–	–			65
10–R	3.5	9	69	68	70	–	–			45
10–L	2	6	74	71	75	–	–			60
3–R	No Test				90	–	–			80

The black rectangle represents the watch tick results. A comparison of the results shown in columns III and IV shows that the phonograph audiometer gives results which are in good agreement with the reduced results from the standard speech tests. The differences are well within the observational error.

The watch tick results are just what one would expect from the amplitude frequency characteristic of this type of sound. It is interesting to note that if patients 3 and 5 were given a watch tick test only they would be considered to have the same amount of hearing, but further tests showed that patient 3 could hear speech at 20 feet while patient 5 could hear it only 2 feet away. It is evident from the audiograms why this is true. Patient 5 hears the high frequencies very much better than the low frequencies. An examination of the various audiogram charts indicates that the 3-A audiometer reading gives a good criterion of the general hearing level. However, results obtained by it are not definitely correlated to the hearing loss for speech, although there is a general agreement. A notable exception is the lack of agreement in the results obtained by patient 10. The 3-A gave 45 SU for the right and 60 SU for the left ear. The phonograph audiometer gave the hearing loss for speech as 70 SU for the right and 75 SU for the left ear. An examination of the audiogram for patient 10 shows why this should be. The important frequencies for speech interpretation, that is, from 500 to 2000, are considerably below the general level, the low frequencies being the highest. This is also true for patients 8 and 9. For patient 5 the speech frequencies are on about the same level as the low frequencies, but very little loss is shown for the high frequencies. In this case it is probable that the 3-A audiometer tone was heard because of components between 2000 and 8000 vibrations per second.

Method of Calculating Hearing Loss for Speech from an Audiogram.

Our studies on speech and hearing have indicated that the important frequencies for interpreting speech are between 500 and 2000 vibrations per second. The simple method of taking an average of the hearing losses at 512, 1024, and 2048 for determining the hearing loss for speech gives results in good agreement with observations on these 10 patients. In Table V is shown a comparison of results thus obtained. The observed values are averages of the figures given in columns III and IV of Table IV. The per cent hearing loss is obtained by multiplying the figures by .83. Until more

accurate methods are devised this simple procedure will be useful in calculating from the audiogram, the per cent hearing loss for speech which is the figure of greatest interest to the patient.

Summary of the Different Methods of Testing the Acuity of Hearing.

In conclusion then it has been shown that to determine the hearing loss in sensation units for speech the following methods may be used.

1. *Voice Tests.* At a distance of one foot whisper numbers at average intensity. If understood, hearing loss is less than 32 SU. Then find maximum distance of hearing for average whisper. From Table II find corresponding hearing loss in column 2. If average whisper is not understood at one foot distance, repeat the test, using loud whisper or PP voice. If then understood, the hearing loss is less than 47 SU. Find maximum distance for hearing

TABLE V.

HEARING LOSS FOR SPEECH.

Ear Number	Calculated from Audiograms	Observed Average
1—L	2	0
1—R	2	0
2—L	20	15
2—R	16	15
3—L	39	31
3—R	89	90
4—L	40	40
4—R	72	65
5—L	52	50
5—R	61	55
6—L	55	50
6—R	48	50
7—L	48	50
7—R	73	70
8—L	61	58
8—R	60	58
9—L	68	65
9—R	72	70
10—L	75	75
10—R	66	70

loud whisper and look up corresponding hearing loss in column 3. If PP voice is not understood at one foot distance, use MF voice, using column 4 to reduce results. Finally, if MF is not understood, use FF voice and proceed as before in previous cases, using column 5. When greater accuracy is desired determine Y_0 for the voice intensity used and read hearing loss from curve of Fig. 1 (Appendix C). In cases of unilateral deafness use 3-A audiometer

or some equivalent for introducing a definite amount of noise into the good ear while testing the bad ear.

2. Phonograph Audiometer. When testing one patient at a time adjust the receiver to ear being tested and ask patient to repeat numbers that he hears. By means of auxiliary receiver check the correctness of his interpretation. Turn attenuator dial until the patient is calling only about 50 per cent of the numbers correctly. Read hearing loss on the dial. In cases of unilateral deafness no noise is required for masking hearing in the good ear while testing the bad ear unles the difference in hearing of the two ears is greater than 50 SU.

When testing a group of 12 or 24, ask the subjects being tested to write down the numbers as long as they can possibly hear them. It is convenient to use special blanks prepared for this purpose. Compare their written record with the master sheet. The average of hearing losses corresponding to the last three numbers written is taken as the hearing loss for speech.

3. Hearing Loss for Speech Calculated from Audiogram. If an audiogram has been taken which shows the loss at each frequency, the approximate hearing loss for speech can be obtained by taking an average of the hearing loss at pitches corresponding to 512, 1024 and 2048 vibrations per second. To convert from hearing loss in sensation units to per cent hearing loss for speech, multiply by .83.

To determine the hearing loss in sensation units for pure tones of various pitches, that is, to obtain an audiogram, the following methods can be used.

1. Tuning Forks (Constant Initial Amplitude). At the time of giving the fork a standard blow start the stop watch. Hold the fork to the patient's ear in standard way. Stop watch when the patient signals he no longer hears. Subtract the time in seconds given by the stop watch from the normal hearing time and then multiply by a constant of the fork to obtain the hearing loss in sensation units. For increased accuracy repeat the test several times. Proceed in this way for the entire pitch range of tuning forks.

2. Tuning Forks (Comparison with Hearing of Tester). In this method it is not necessary to maintain a standard initial amplitude. After striking the fork hold to patient's ear. When he signals he no longer hears, start the stop watch. Transfer tuning fork to

your own ear and stop the watch when you last hear the sound. The reading of the stop watch, multiplied by a constant of the fork, gives the difference in hearing loss between your ear and that of the patient.

3. Pitch Range Audiometer. Adjust receiver to ear of the patient. Turn the attenuator dial until patient no longer hears sound. Check the threshold point thus obtained by throwing the sound on and off by means of a push button and asking the patient to signal the on and off time by means of the signal switch.

If using a 1-A or 2-A audiometer the dial reads directly the hearing loss in sensation units. When using other types of audiometers a calibration curve can be constructed to reduce the results to sensation units.

To obtain a quick test of the general level of hearing loss for the entire pitch range use the 3-A audiometer. After adjusting the receiver to patient's ear, turn the dial until he no longer hears. The dial then reads directly the per cent hearing loss.

If the results of the various hearing tests are reduced to hearing loss units as indicated then *the results of one observer will be directly comparable with those of another.*

APPENDIX A.

The relation between hearing loss in sensation units and the maximum distance for hearing and interpreting speech is established as follows. It is well-known that the intensity of sound decreases as the inverse square of the distance from the source. This is true only where there are no solid objects in the vicinity which cause reflections. Stated mathematically

$$\frac{I}{I_0} = \frac{d_0^2}{d^2} \qquad (1)$$

where I is the intensity at a distance of d and I_0 the intensity at a distance of d_0 from the sound source. From the definition of hearing loss given

$$\text{H.L.} = 10 \log \frac{I}{I_0} \qquad (2)$$

Combining (1) and (2)

$$\text{H.L.} = 20 \log \frac{d}{d_0} \qquad (3)$$

As stated in the paper it has been found that the speech sounds entering a normal ear from a caller whose lips are 1½ inches or ⅛

foot from the opening of the ear canal may be attenuated 80 SU before 50 per cent of the called numbers are misinterpreted. This was determined experimentally by means of a high quality telephone system into which was introduced an attenuator similar to those used on the Western Electric audiometers. The dial of the attenuator was first set so that the speech emerging from the telephone receiver had an equal intensity to that produced when talking directly into the ear at ⅛ foot distance. The attenuator was then turned until the person of normal hearing could only interpret half of the numbers called. The difference in the settings was found to be equal to 80 SU. In a similar way it was found that the corresponding differences when an average whisper, or PP voice, and a FF voice was used were approximately 50 SU, 65 SU and 95 SU respectively.

The normal distances for interpreting numbers can be obtained from these figures. From equation 3 it follows that

$$d_0 = \tfrac{1}{8}\ 10^{\frac{50}{20}} = 39.5 \text{ feet for the average whisper}$$

$$d_0 = \tfrac{1}{8}\ 10^{\frac{65}{20}} = 222 \text{ feet for the PP voice}$$

$$d_0 = \tfrac{1}{8}\ 10^{\frac{08}{20}} = 1250 \text{ feet for the MF voice, and}$$

$$d_0 = \tfrac{1}{8}\ 10^{\frac{95}{20}} = 7040 \text{ feet for the FF voice}$$

Using these values for d_0 and equation (3) the corresponding values of hearing loss H.L. and distance d given in Table II were calculated.

APPENDIX B.

Let the maximum distances for hearing the average whisper, PP voice, MF voice, and F voice be d′, d″, d‴, and d⁗, for the patient, and d_0', d_0'', d_0''', and d_0'''', for a person of normal hearing. Then from equation (3), Appendix A,

$$20 \log \frac{d_0'}{d'} = 20 \log \frac{d_0''}{d''} = 20 \log \frac{d_0'''}{d'''} = 20 \log \frac{d_0''''}{d''''}$$

or,

$$\frac{d_0'}{d'} = \frac{d_0''}{d''} = \frac{d_0'''}{d'''} = \frac{d_0''''}{d''''} \qquad (1)$$

This equation states that regardless of the intensity of voice used, the ratio of the hearing distance for the normal ear to that for the

ear of the patient is the same. Let x', x'', x''', and x'''' be the increased hearing distances corresponding to a hearing improvement q for the four types of voices. Then

$$q = 20 \log \frac{d_0'}{d''} = 20 \log \frac{d_0'}{d' + x} = 20 \log \frac{(1 + x')}{(\quad d')}$$

Similarly

$$q = 20 \log \frac{(1 + x'')}{(\quad d'')} = 20 \log \frac{(1 + x''')}{(\quad d''')} = 20 \log \frac{(1 + x'''')}{(\quad d'''')}$$

or,

$$\frac{x'}{d'} = \frac{x''}{d''} = \frac{x'''}{d'''} = \frac{x''''}{d''''} \qquad (2)$$

Combining equations (1) and (2)

$$\frac{x''''}{x'} = \frac{d_0''''}{d_0'} = \frac{7040}{39.5} = 178$$

$$\frac{x'''}{x'} = \frac{d_0'''}{d_0'} = \frac{1250}{39.5} = 31.7$$

$$\frac{x''}{x'} = \frac{d_0''}{d_0'} = \frac{222}{39.5} = 5.6$$

This leads to the very important conclusion that if a patient shows an improvement of 1 foot when using the average whisper he will also show an improvement of 5.6 feet, 31.7 feet and 178 feet for the other three intensities of calling. This is true regardless of the amount of the improvement; if it is small, the additional distance will be added to a large distance; if large, to a small distance.

APPENDIX C.

Equation (3) of Appendix A can be written

$$\text{H.L.} = 20 \log d_0 - 20 \log d = Y_0 + Y$$

Construct a curve with ordinates equal to

$$Y = -20 \log d$$

Then by adding ordinates of this curve corresponding to d and d_0 the hearing loss in sensation units is obtained. The numerical values of Y will be positive and must be added to Y_0 for distances smaller than one foot and will be negative and must be subtracted for distances greater than one foot. Fig. 1 shows such a curve for

distances from 1 inch to 18 feet. For greater distances this same curve can be used as follows: For distance 10 times those shown, subtract 20 from ordinate shown; for distance 100 times, subtract 40; for distance 1000 times, subtract 60; and for distances 10,000 times, subtract 80. For example, the Y corresponding to 40 feet is —12—20=—32; corresponding to 400 is —52; corresponding to 4000 is —72. The values of Y_0 for the first four types of calling described in the paper and which correspond to the normal distances for interpretation are 32, 47, 62, and 77 respectively. It was shown in Appendix A that the normal distances for hearing are too large to be determined directly except for intensities lower than the average whisper so that other methods must be used for determining Y_0. If a patient is available whose hearing loss has been accurately determined by audiometric methods a test of his hearing with the intensity of voice which it is desired to use will determine Y_0. For example, suppose a patient's hearing loss is 50 sensation units and a test shows that he hears at a distance of but 1½ feet, then from the curve it is seen that the ordinate Y corresponding to 1½ feet is 2. So, it is seen from the equation above that

$$50=Y_0-2$$

so that for such a voice

$$H.L.=52-Y$$

Assuming that a room is only 20 feet long, the minimum hearing loss that can be measured with this type voice is

$$52-26=26 \text{ SU}$$

Assuming that results are unreliable for distances closer than 6 inches, the maximum hearing loss that can be measured by such a voice is 58 sensation units. This method was used to determine the values of Y_0 shown in Table III. The results shown in columns II and III of this table were computed by the method outlined in this appendix.

APPENDIX D.

It is well known in dynamics that the motion of a tuning fork can be represented by

$$A=A_0 e^{-a(t_0-t)} \cos 2\pi n (t_0-t) \quad \ldots\ldots (1)$$

where t and t_0 are the times at which the fork has the amplitude A and A_0 respectively, and n is the number of double vibrations per second executed by the fork and a is the damping constant. The intensity of sound radiated by this fork and reaching the ear is proportional to the square of the amplitude of vibration. Consequently if I and I_0 correspond to the intensities at times t and t_0, then

$$\frac{I}{I_0} = e^{-2a(t_0-t)} \qquad (2)$$

The hearing loss then by definition is

$$\text{H. L.} = 10 \log_{10} \frac{I_0}{I} = \frac{20a}{2.3}(t_0-t)$$

where t_0 and t correspond to the hearing for the normal ear and the ear of the patient.

The constant $\triangle$ is defined as

$$\triangle = \frac{20a}{2.3} = 8.68a$$

and is the damping expressed in sensation units per second. In other words, $\triangle$ is the number of sensation units that the sound intensity level lowers during each second of time.

If t_1 is the hearing time for the tester, and t_2 for the patient, and $(HL)_1$ and $(HL)_2$ are the corresponding hearing losses, then

$$(HL)_1 = \triangle(t_0-t_1) \text{ and } (HL)_2 = \triangle(t_0-t_2)$$

Combining

$$(HL)_1 - (HL)_2 = \triangle(t_2-t_1)$$

Or the difference in hearing time for the tester and the patient multiplied by $\triangle$ gives the difference in sensation units between the hearing loss of the patient and that of the tester.

VALUE OF HEARING TESTS BY THE AUDIOMETER.*

Dr. J. Ivimey Dowling, Albany, N. Y., and R. L. Wegel.**

PART I—CLINICAL DISCUSSION BY DR. J. IVIMEY DOWLING.

The purpose of this paper is to describe briefly the audiometer, its construction, use, its relative value, and to present some original observations covering a large series of cases. In all cases the findings were checked by functional and other tests when indicated.

It is well known that the time that a tuning fork will vibrate depends not only upon the forks themselves, but also upon the force with which they are set in vibration. It has been very carefully determined that the energy applied to a fork by a freely falling weight has an error of 20 per cent. The same fork in the hands of one observer may show fairly constant results while when used by another show a different result because of the force with which one sets the fork in vibration. Also, different forks used by the same observers will have different periods of vibration while, in contrast, *the audiometer gives a pure tone of standard intensity and the minimum intensity necessary to excite the auditory nerve is determined rather than the length of time during which a tone is heard.*

It requires but a short time to learn to take the tests and the error in observation is very small. *In many cases it is possible to make a complete test with this method in five minutes, but it may take longer in persons of sluggish or nervous mental states.*

Since the audiometers are standard an audiogram taken by one observer on his instrument will show the same curve as one taken on a different instrument by another observer, and different observers on the same patient will get results that will not vary more than five sensation units and will present similar curves which permit in each instance similar diagnosis. The facts are well illustrated in Fig. 1.

This immediately strikes one as of prime importance in cases where a patient goes to a different city and is being treated by a confrere, and in the reporting of cases it gives a common ground for discussion and in legal cases a definite loss in percentage may be determined.

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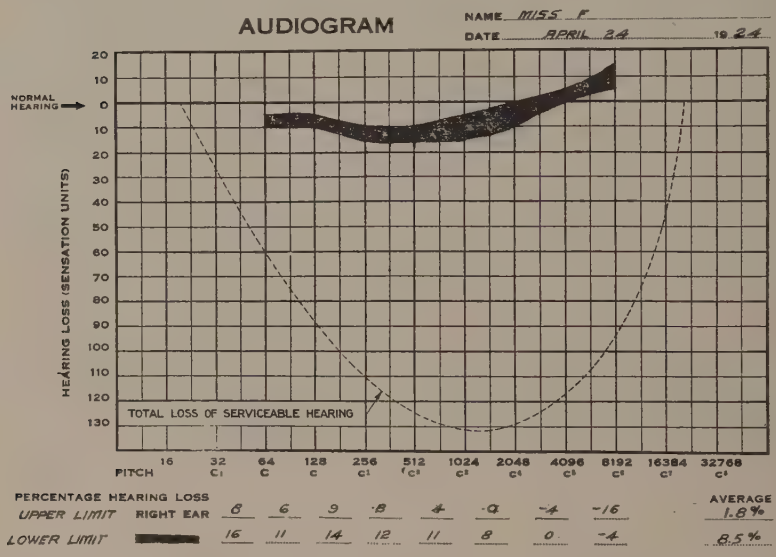
**Research Laboratories of the American Telephone and Telegraph Co., and the Western Electric Co., Incorporated.

Another advantage is to be found in that often times a very good test can be taken of an advanced case of deafness.

In cases of impaired sound conduction, whether due to impacted cerumen, otitis media, with or without perforation of the membrana tympani, otosclerosis, etc., and when the nerve itself shows no lesion either central or peripheral, the characteristic curve shows an increased intensity necessary for audibility for the lower tones more marked than for the higher ones, which necessarily results in a per

FIG. 1



COMPOSITE GRAPH SHOWING UPPER AND LOWER LIMITS FOR RIGHT EAR REPRESENTING THE RESULTS OBTAINED BY FOUR OBSERVERS WITH THE SAME PATIENT.

THE OBSERVERS WERE; A GENERAL PRACTICIONER, A LABORATORY TECHNICIAN, AN X-RAY TECHNICIAN, AND A TRAINED OBSERVER, WHO TOOK TEN MINUTES TO DESCRIBE THE METHOD OF TAKING THE TEST. THE TIME REQUIRED TO TAKE THE TEST WAS 14, 20, 17, AND 5 MINUTES RESPECTIVELY. THE GREATEST VARIATION FROM THE AVERAGE WAS 1.5%

cent drop in the chart curve for low tones. In the curves taken the 512 d. v. tone seems to be about the center between the conduction types and the nerve types. This all corresponds exactly to the results found by testing with the forks where there is a loss for the lower forks especially.

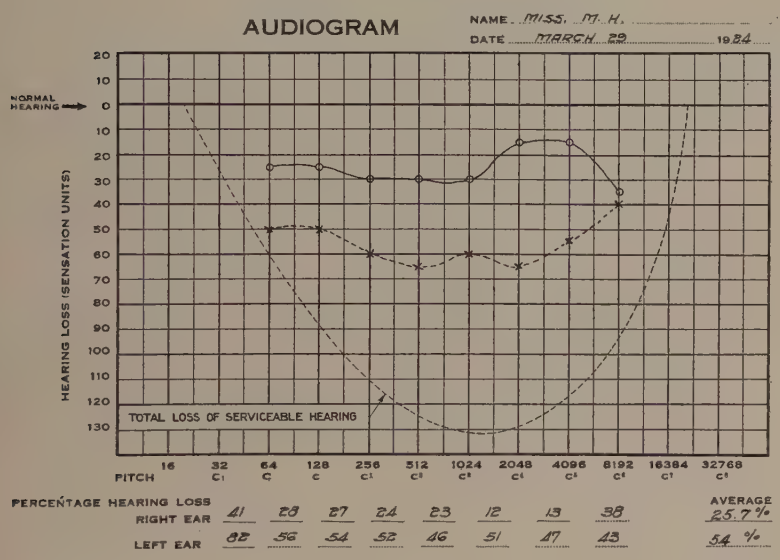
This similarity is also present in cases of nerve deafness when the chart-curve may show a loss for all tones, but especially the high

tones where the curve will take a rapid drop and in the cases of fairly well advanced lesions the patient may not hear them at all.

In the mixed type of cases there will be a decided drop at both ends. When there is a marked difference between the two ears of the same patient, the sound may be perceived in the better ear before it is heard by the poor ear then being tested. So far we have only observed this in two cases.

In all cases where there was a difference of 10 or more sensation units between the two ears a Weber test was made with the corresponding fork. It has been found that the Weber will be to the

FIG. 4


AUDIOGRAM
NAME MISS, M. H.
DATE MARCH 29 1924
NORMAL HEARING
HEARING LOSS (SENSATION UNITS)
TOTAL LOSS OF SERVICEABLE HEARING
PITCH
PERCENTAGE HEARING LOSS
RIGHT EAR 41 28 27 24 23 12 13 38 AVERAGE 25.7%
LEFT EAR 82 56 54 52 46 51 47 43 54 %

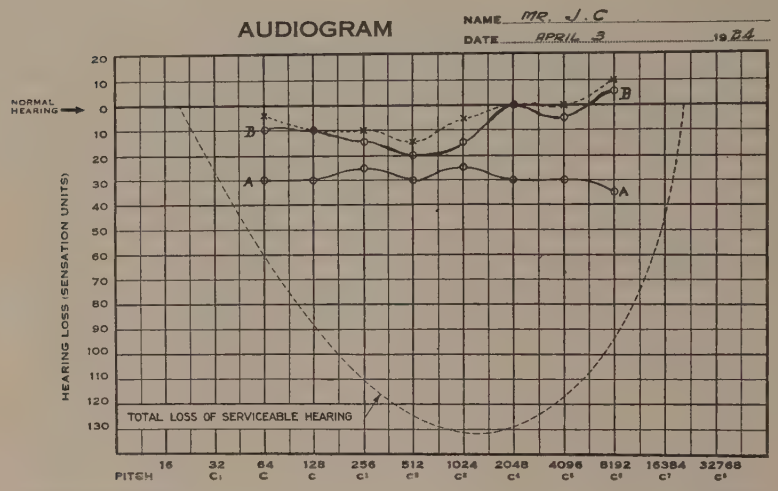
THE WEBER TEST WAS MADE WITH THE FORKS, #128, #256 AND #512 AND WERE ALL TO THE LEFT.

side showing the greater loss in all cases except those which show a nerve deafness on that side, as illustrated in Fig. 4.

In reviewing the cases I wish to call to your attention certain typical cases of the various common types of deafness. The simplest as far as curve is concerned is the case of impacted cerumen or other obstructive disease of the external auditory canal as shown in Fig. 8, which is a chart from a case of exostosis and furuncular abscess of the external canal.

In cases of impaired hearing due to obstruction to the external auditory canal the chart-curve will show the greatest drop for the low tones in cases of simple type. The fineness of the audiometer record is such that it suggests in some cases of this nature an irritable auditory nerve (probably an initial congestion incident to the possible complicating Eustachian tube factor). In such cases the chart-curve for high tones may also show a decided drop which disappears promptly after removal of the offending obstruction in the canal, for the complicating Eustachian tube factor will recover spontaneously upon removal of the obstructing pathology in the external auditory canal.

FIG. 8

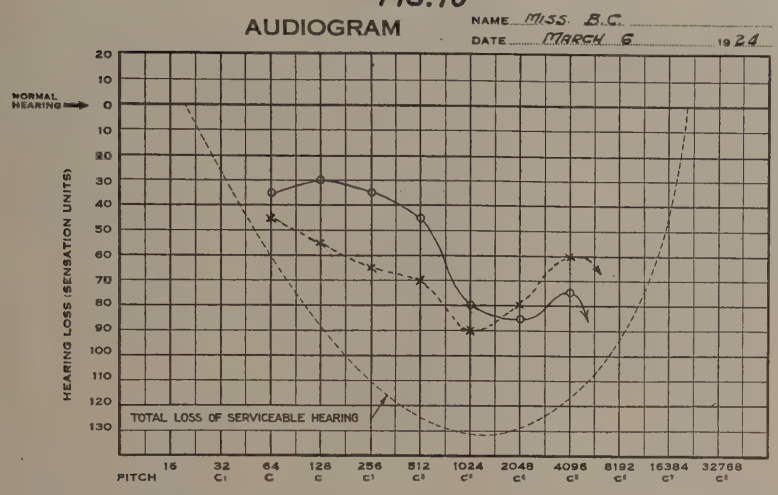

AUDIOGRAM
NAME MR. J.C
DATE APRIL 3 1924
NORMAL HEARING
HEARING LOSS (SENSATION UNITS)
TOTAL LOSS OF SERVICEABLE HEARING
PITCH
16 32 64 128 256 512 1024 2048 4096 8192 16384 32768
C1 C C C1 C2 C3 C4 C5 C6 C7
PERCENTAGE HEARING LOSS
A A RIGHT EAR 42 34 23 24 19 23 36 38 AVERAGE 29.5 %
LEFT EAR 8 11 9 12 4 0 0 -11 4.1 %
RIGHT EAR B B 16 11 14 16 11 0 4 -11 7.5 %
ON APRIL 28-1924

THIS CASE SHOWS CONDUCTION LOSS DUE TO EXOSTOSIS AND FURUNCULAR ABSCESS OF EXTERNAL AUDITORY CANAL WALL OF RIGHT EAR. OCCLUDING CANAL TEST TAKEN WHEN FIRST SEEN ON APRIL 3 1924 AND LATER ON APRIL 28, 1924 WHEN CURED.

As we glance at a field of vision and say, there is a case of optic neuritis or hemianopsia, as the case may be, so we can look at this curve and at a glance be fairly certan of the diagnosis. It is a picture and a record which may be stated in per cent and so readily comprehended by banker or borrower, rich or poor, doctor or layman.

From this type let us go to the opposite extreme and observe the curve in a pure nerve deafness. Again we have the graphic repre-

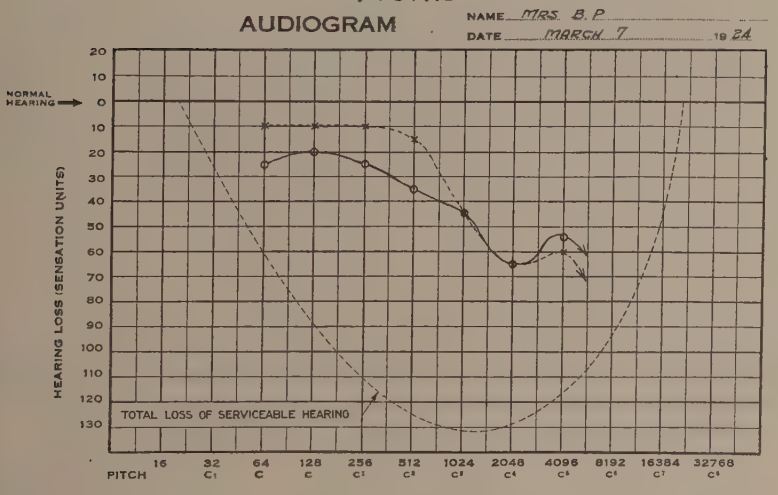
FIG. 10


AUDIOGRAM
NAME MISS. B.C.
DATE MARCH 6 1924
NORMAL HEARING
HEARING LOSS (SENSATION UNITS)
TOTAL LOSS OF SERVICEABLE HEARING
PITCH
16 32 64 128 256 512 1024 2048 4096 8192 16384 32768
C1 C C1 C2 C3 C4 C5 C6 C7 C8

PERCENTAGE HEARING LOSS									AVERAGE
RIGHT EAR	57	34	32	36	61	66	64	.....	56.2 %
LEFT EAR	74	62	59	56	69	62	51	—	66.7 %

CASE OF NERVE DEAFNESS
WASSERMANN ++ (INHERITED)

FIG. 12


AUDIOGRAM
NAME MRS. B.P.
DATE MARCH 7 1924
NORMAL HEARING
HEARING LOSS (SENSATION UNITS)
TOTAL LOSS OF SERVICEABLE HEARING
PITCH
16 32 64 128 256 512 1024 2048 4096 8192 16384 32768
C1 C C1 C2 C3 C4 C5 C6 C7 C8

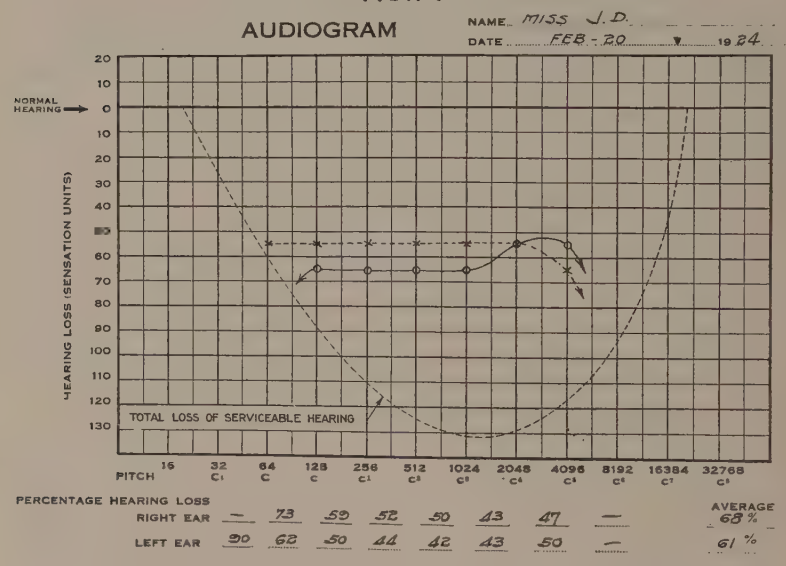
PERCENTAGE HEARING LOSS									AVERAGE
RIGHT EAR	41	22	23	28	34	51	51	—	43.6 %
LEFT EAR	16	11	3	12	34	51	47	.....	35. %

NERVE DEAFNESS WITH FAMILY HISTORY OF DEAFNESS.
OPERATED SUBMUCOUS RESECTION AND OPENING OF ETHMOID CELLS
ONE YEAR A GO. WASSERMANN NEGATIVE.

sentation of the lesion. There may be a marked lowering of the curve throughout but always with a sharp fall after the 512 d. v. pitch. In mild cases all the tones are heard but in advanced cases the curve drops off and the higher pitches are not perceived at the greatest intensity possible of being produced. There is nothing new in this; for we have the same result with the forks, but here we have a picture for our records and for the patient as illustrated in Figs. 10 and 12, taken in cases of nerve deafness, the one showing Wassermann plus 2, the other Wassermann negative.

The audiograms of the mixed type of deafness present two general types which may be read at a glance and suggest the possible basic cause of syphilis or the contrary. Fig. 10 shows a graph of a

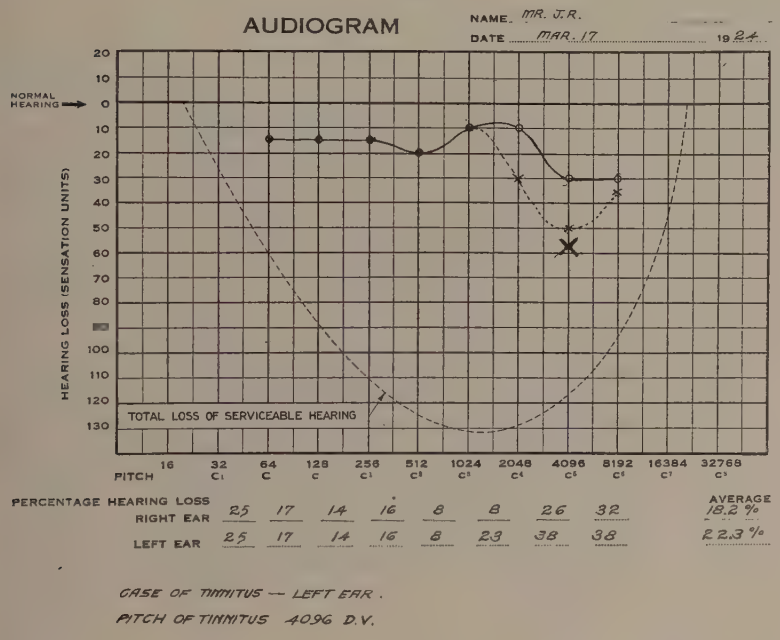
FIG. 14



patient with Wassermann plus 2 in which the loss for the higher pitched tones is in excess of the loss for the lower pitches. This type graph has been found in our cases to be strongly suggestive of syphilis as a basic cause and when noted emphasizes the need for immediate Wassermann being determined. On the contrary Fig. 14 represents a patient with mixed deafness in which the graph exhibits a loss of the low and high pitches more nearly alike. This patient as in others presenting similar pictures showed Wassermann negative. However, the cause is believed to be due to a bacterial toxin originating in the ethmoid cells.

After referring to Figs. 10 and 14 attention should again be directed to Fig. 12, which is a graph of as pure nerve deafness as is ever observed. It will be noted that the graph indicates but comparatively little conduction fault. This patient presented a family history of deafness of sudden onset. Wassermann negative. The deafness occurred as suddenly as blindness ensues in acute glaucoma and is representative of a large group in which the writer believes deafness results because of sudden increase of labyrinthine tension. It is interesting to note that the greatest and most permanent bene-

FIG. 15



fits in this particular type of cases results from radical ethmoid surgery as had been demonstrated in the writer's practice many times.

These conclusions as to graphs taken in the mixed and nerve types of deafness is still *sub judice*, but if corroborated by other observers would prove valuable in that the reading of the primary graph would at once suggest the most appropriate line of treatment.

Some records show islands of impaired hearing or actual loss of hearing as far as we are able to determine with this instrument for some particular tone. These are analogous to the scotoma of the visual fields. As yet it is a little early to predict the great importance of this finding. It is interesting to note that in testing patients

complaining of tinnitus that they are sometimes able to determine the pitch of their tinnitus when that particular pitch is tested. In all cases observed so far in this manner it will be seen that the pitch of the tinnitus will correspond to the pitch which shows the greatest loss of hearing, as evidenced by chart-curve recorded in Fig. 15. Taking for granted that the tinnitus is produced by mechanical means in the sound conducting apparatus, it is reasonable to presume that these drops represent a cochlear lesion which causes the conduction apparatus to operate at impaired efficiency for that pitch. It is interesting to take tests before and after treatment and observe the results obtained.

In stating a final summary as to the value of the audiometer it is possible to state:

1. That accurate tests may be made by office assistant or trained otologist with a minimum of difference in the tests, but with a constant diagnostic value.

2. The recorded graphs are easily interpreted and make possible a tentative diagnosis even before making a fully complete examination of the patient.

3. The graphs visualize to both the physician and patient the defects in hearing and easily suggest the type of disease causing the deafness, that is, whether of the conducting apparatus or of nerve origin.

4. The graphs are analogous to visual charts and are of like value in picturing the hearing loss in per cent.

5. Comparison of sequent charts demonstrates to the patient actual improvement in function or the contrary and are therefore of greater value than tuning fork tests which patients cannot understand.

6. The audiometer makes possible speedy and accurate tests which eventually will prove of no uncertain value in medio-legal cases.

In preparing this paper I wish to acknowledge the help obtained from the reports by Dean, Bunch, Wilson, Minton, Fowler, and Wegel, and Fletcher.

PART II. PHYSICAL DISCUSSION BY R. L. WEGEL.

In the past few years a great deal of attention has been concentrated on the use of the audiometer for diagnosis of ear diseases. The audiometer gives the same sort of data as that formerly taken with tuning forks. There is, however, a difference which appears to be recognized that gives the audiometer a considerable advantage. Otologists have been using tuning forks for a great many years and

have correlated, each man more or less in his own way, the findings with tuning fork tests and physical conditions of the patient. Each otologist has a fairly definite idea of the meaning, therefore, of his tuning fork data as a result of long experience. The audiometer at the present time has the disadvantage of not having its readings thoroughly correlated to different ear conditions. This disadvantage is rapidly disappearing.

Fig. 1 (Wegel) is a picture of the audiometer used in the tests made and described in this paper. It is completely contained in a box about one foot square by two feet long. It consists of a vacuum tube oscillating circuit capable of furnishing very pure waves of

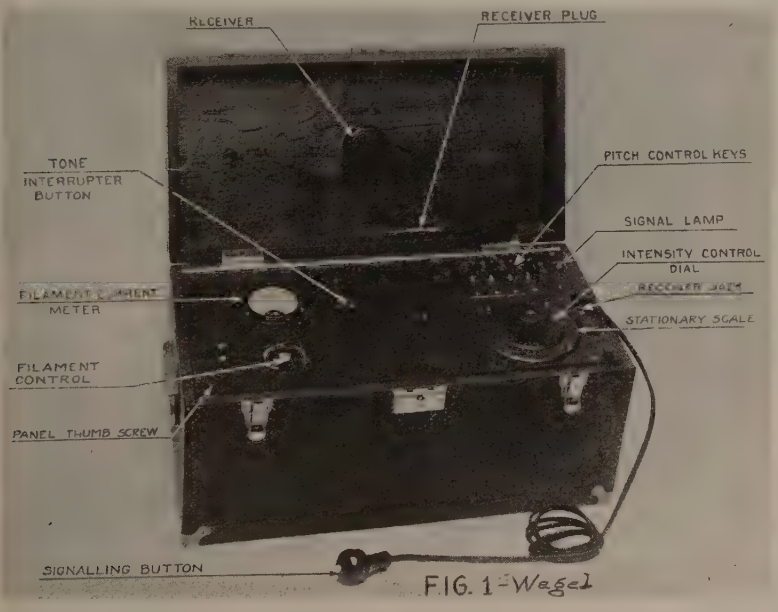


FIG. 1-Wegel

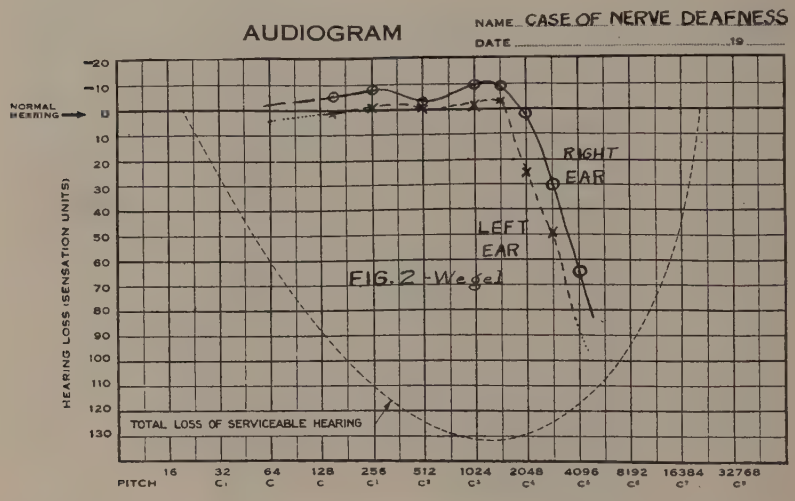
pitches, 64, 128, 256, 512, 1024, 2048, 4096 and 8192 d. v. The apparatus is started by turning the small knob until the ammeter on the panel reads a proper value of filament current. The frequency is varied by means of the four keys in the upper right hand corner of the panel.

The oscillating currents are delivered to an attenuator by means of which they can be varied in definite amounts before being delivered to the damped receiver shown attached to the cover. The variation is done by means of the marked dial in the lower right hand corner, from which hearing loss can be read directly when adjusted so as to be just audible to the patient.

A push button and flash lamp is attached by means of which a patient may signal the operator when he hears a tone. This eliminates the distracting effect of talking and increases the speed and accuracy in making the measurements.

The apparent advantages of the audiometer over the tuning forks are a result of the conciseness and definiteness with which the data can be recorded and transmitted from one doctor to another.

With an audiometer which is working properly there should be no material difference between the findings of different doctors or between the doctors and their assistants. This is not always true in the case of tuning fork tests. In order to give the audiometer readings a maximum of significance, every detail in the mode of pre-



sentation must be carefully worked out. Audiometer readings can be presented on charts in such a way as to have very little significance. Or again, they may be presented so as to have a great deal of significance. It will perhaps be of interest to discuss briefly the method used in charting results taken with the audiometer.

Fig. 2 (Wegel) shows a sample audiogram. This is a plot of loss of hearing at different pitches. Loss of hearing is defined as the difference between the acuity of the average normal ear and that of the subject being tested. In the right ear of this patient, for instance, it will be seen that his acuity for all pitches below about 2048 d. v. he is lightly above the average normal in acuity, but for pitches above this, he is very deaf. The question is usually asked: "How much hearing have I lost?" or, "How much hearing have I left?"

The older method of answering this question is usually to give in terms of the number of feet away from the patient that he can hear a whisper or a watch tick as compared to the same distance for a normal ear. Recent experiments have shown, however, that either of these sounds lose more in intensity in going from close to the ear to a distance of about a foot than they do in going the remainder of the distance across an ordinary room. This means that a distance of a foot or two feet at the far end of the room causes an extremely small change in the intensity of sound, whereas the change of this same amount when very near the ear causes a very large change. Such a percentage figure, while useful in the absence of a better test, is very inaccurate and likely to be misleading. It is rather difficult to define exactly what is meant by total loss of hearing. If a person

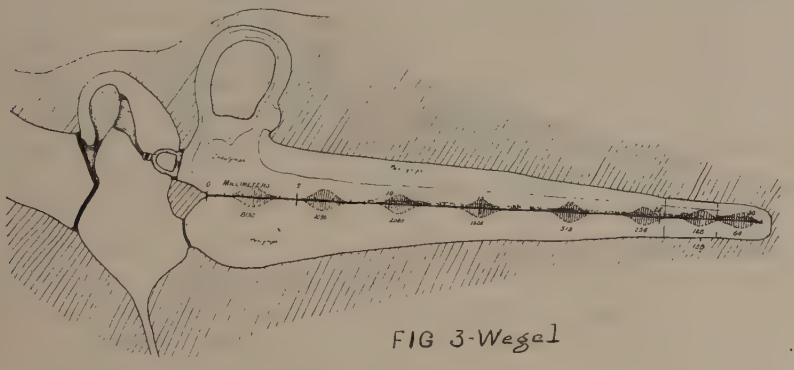


FIG 3-Wegel

has a completely dead auditory nerve, he is, of course, incapable of sensing sound with it and is totally deaf. It is never possible by means of a functional test only to say that a person is totally deaf, because there is always the possibility that if he could be tested with a sound just a little louder than it is possible to obtain he might hear it. We are reduced to the necessity of finding an arbitrary definition of total loss. When a sound is increased to a certain point in loudness, there is a large motion of the ear mechanism which results in a sensation of feeling, that is, in a stimulation of nerves apparently other than the auditory nerve. Sounds as loud as this are very disagreeable to listen to and sometimes result in pain. A large number of measurements have been made at various pitches to determine the intensity of the sound which gives this sensation of feeling. It has been found that for normal ears there is a very definite level which is considerably louder than is obtainable by means of tuning forks. Sounds louder than this can be heard and also felt, but they are of

no use in hearing because of this painful sensation. It is convenient, therefore, to take this threshold of feeling as being the intensity of "maximum audibility". If a person is just so deaf as to feel as easily as he can hear, his audiogram will coincide with the dotted line marked "Total Loss of Serviceable Hearing". The percentage loss of hearing is then the fractional amount of distance between the normal hearing line and that of total loss. For example, in the case of the patient whose audiogram is shown in Fig 2, at 4096 d. v. there is a loss of about 65 sensation units out of a total possible 115. This means a loss a little over 50 per cent. In the left ear at 2048 d. v. there is a loss of 25 sensation units out of a possible 130, or about 20 per cent in hearing.

At very low frequencies there is considerable question as to whether the sounds are heard or felt. The sensation is certainly different than it is at the higher pitches. The same is true of extremely high frequencies. As the audiogram diagram shows, the range between the loudness of sound necessary for the threshold of hearing and that of feeling becomes less and less. The points at which these thresholds approach coincidence, about 20 d. v. to 20,000 d. v., may be conveniently defined as the upper and lower pitch limits. The curves as plotted on this sort of a chart may then be seen in perspective relative to the normal hearing line, the line of total loss and the upper and lower pitch limits. A convenient picture of the extent of the loss is thereby made immediately apparent to the eye.

This patient has been diagnosed as a case of nerve deafness. The middle and external ear are at present very little, if any affected. It is interesting to philosophize on the interpretation pathologically of this audiogram. This can best be done from the standpoint of the latest information and theories available on the mechanism of the performance of the cochlea.

Fig. 3 (Wegel) is a conventional diagram of the ear mechanism with the cochlea unrolled. The basilar membrane is shown with marks along it indicating the number of millimeters from the base. It is taken as being a little over 30 m.m. long. According to the latest information on the dynamics of the ear, we are able to locate the exact spot and its extent on the basilar membrane at which a sound of any pitch stimulates it. The spots stimulated by the different tones of the audiometer are shown. 1024 d. v. stimulates a membrane at about its middle point and the extent or width of the area of stimulation is about 2 m.m. The character of the stimulation due to the particular construction of the mechanism is much the same as would take place if a toothpick with glue on the end of it were

attached to the membrane at that point and moved rapidly up and down. Pitches for the audiometer were chosen so as to test the membrane at equidistant intervals along it. There are gaps between these spots which are not tested, but it is to be presumed that lesions are usually of such a character as to affect a region which is more than 5 m.m. long. When the sounds are extremely loud, of course, the area stimulated is wider than 2 m.m. and hence these gaps are bridged to a certain extent when a very deaf ear is tested.

The case illustrated in Fig 2 (Wegel) shows a very great loss of hearing above 2048 d. v. for the right ear. By reference to this chart it will be seen that pitches normally stimulating the basilar membrane from its origin up to 10 m.m. along its length are not sensed by this patient. One possible interpretation of this is that at some time or other an infection penetrated into the cochlea from the oval window and destroyed the nerve terminals along this length of the membrane, and that the patient has lost the use of the lower third of his basilar membrane. In the left ear the affected area extends a little farther, possibly 11 or 12 m.m. from the base.

There are, of course, other possible explanations for this type of an audiogram but it is hardly worth while to go into them at this time. The above interpretation is given merely as suggestive of what might be done.

THE POTENTIALITIES OF THE AUDIOMETER.*

Dr. Max A. Goldstein, St. Louis.

The development of the audiometer has successfully passed the experimental stage and we are now concerned with its presentation as an instrument of precision, a means of accurately charting sound as perceived by the ear and a diagnostic aid in the differentiation of types of hearing defects.

In 1897, C. E. Seashore[1] evolved an apparatus which he called an "audiometer", operated by a receiver magnet and electrically-driven toothed wheel with speed-control, by means of which a tonal scale of from 30 d. v. to 7000 d. v. of definitely measured intensities was utilized to determine the range of audition of the human ear.

L. W. Dean and C. C. Bunch[2] applied a modification of this apparatus which they called the Iowa Pitch-Range Audiometer in a study of defects in hearing in a series of cases in the Otologic Clinic of the University of Iowa and to them should be accorded credit for the first application of an audiometer in otology.

The earlier principle of the motor-driven cog-magnet audiometer as devised by Seashore and Bunch has been superseded by the vacuum-tube oscillator and the adoption of radio principles. The first application of the oscillating tube principle for audiometry was described by John Guttman,[3] of New York. Newer forms of audiometer include models of the Western Electric Company, introduced by R. L. Wegel, Harvey Fletcher and E. P. Fowler; the University of Southern California, by V. O. Knudsen and Isaac H. Jones; the Riverbank Laboratories by F. W. Kranz and A. G. Pohlmann.

At the close of the Thirtieth Annual Meeting of the American Laryngological, Rhinological and Otological Society in St. Louis, May, 1924, most of these models were given a practical demonstration at the Central Institute for the Deaf and an informal discussion of their respective merits and shortcomings furnished an interesting introduction to the important problems of standardization and unification, calibration, graphing and simplicity of operation. Among the outstanding features in this discussion, emphasis was given to the following:

THE TONAL RANGE.

The tonal range in the construction of the audiometer should include the full maximum limits of normal audition—16 d. v. to 24,000 d. v. This would make possible the measurement of audition

*Presented at the Fifty-eighth Annual Meeting of the American Otological Society, Washington, D. C., May 5, 1925.

and recording by audiogram of the complete range of sound appreciation in the human ear for even the most delicate research.

THE TONE INTENSITY.

Tone intensity developed in the audiometer is measured in terms of dynes. For the usual functional test of audition, as conducted in clinic or private practice, the otologist would find a sound intensity of one hundred and twenty dynes ample to graph most of his cases within the range of serviceable hearing. As the audiometer, however, serves the additional purpose of determining the capacity of an ear that is profoundly deaf, as is the case in many congenitally deaf children, an increase in the sound intensity to at least two hundred (200) dynes is urged.

BONE CONDUCTION.

The sound in pitch and intensity, as produced by the audiometer, is conveyed to the ear from the disc of the head pieces or ear-phones by air conduction. Many of our former functional tests of hearing are made by differentiation of a sounding tuning-fork between air-conduction and bone-conduction and as these acoustic principles serve as substantial factors in such differential diagnosis in otology, it was recommended that a special bone conduction receiver for carrying out bone conduction tests be added to the equipment.*

The use of a special bone-conduction receiver will necessitate an additional normalcy line and normalcy curve on the audiometer chart, for the graph of bone-conduction audition must be considered as an independent standard and cannot be recorded in the terms of the graph of air-conduction audition.

CALIBRATION AND RECORDING.

One of the most important factors to be determined in the use of the audiometer is a uniform standard of calibration and a uniform standard of recording results of functional tests. The method of calibration is exclusively within the realm of the physicist and as this is based on exact mathematical and electrical measurements, there should be no difficulty about unification of a standard. Stepping off the measurements of sound intensity in divisions of ten dynes each, calibrating all dials for this purpose and ruling all audiograms in squares of ten dynes each seems to be a simple solution of this difficulty. The Western Electric Company seem to have solved the question of accuracy and simplicity in the charting of an audiogram. The heavy horizontal line drawn across the chart at the level of zero dynes represents the *line of normal hearing* and all dials

*Simple forms of bone-conducting receivers were demonstrated at Central Institute for the Deaf, at the Audiometer Conference in May, 1924, by Knudsen, Kranz and Pohlmann.

and indicators on the audiometer are arranged to conform to this normalcy. Extending from this normal hearing line is an irregularly-shaped *u* curve, ranging from a pitch of 16 d. v. to 20,000 d. v. and dipping to beyond 130 dynes in the area of most serviceable hearing (speech area 300 d. v. to 3000 d. v.). This chart offers a simple, comprehensive and dependable form for recording any aype of hearing defect in the range of otology.

I offer a plea for the general adoption of this form of chart as prepared by the Western Electric Company with such modifications as increasing the chart squares to accommodate the seven musical inter-

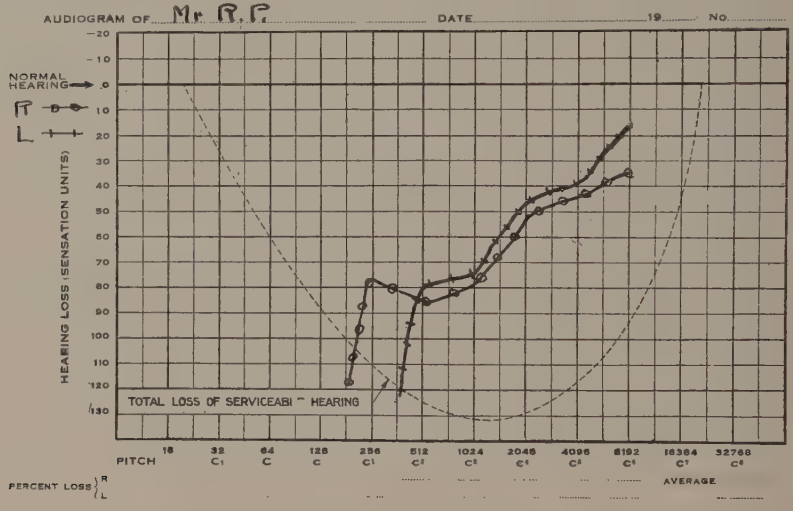


Fig. 1. Conduction Deafness.

This patient, aged 21, has a congenital bi-lateral microtia with absence of both external auditory canals. Patient understands ordinary conversational speech very well.

vals to the octave and the lengthening of the chart to include two hundred dynes of intensity and additional space for recording the results of bone-conduction. With these modifications, this chart covers clearly and simply the necessary and salient features in the production of an audiogram or graphic record of a functional test so standardized that it may be intelligently read from coast to coast by any otologist or investigator so that the story of the audiogram, once told, becomes an invariable record.

TONE INTERVALS.

Of the various types of audiometers demonstrated, one had but two intervals in pitch to the octave and another a sliding scale between octaves. For refinements in test and for determining the possible presence of tone-islands and tone-gaps, I suggest that the usual

standard of musical scale with seven definite intervals to the octave be included in the construction of the larger, research models of audiometers.

Dips in the graph of a given audiogram may be found at certain intervals in the scale, as tested by one-step and two-step instruments which, if recorded with the seven-step instrument, may present an entirely different graph for analysis.

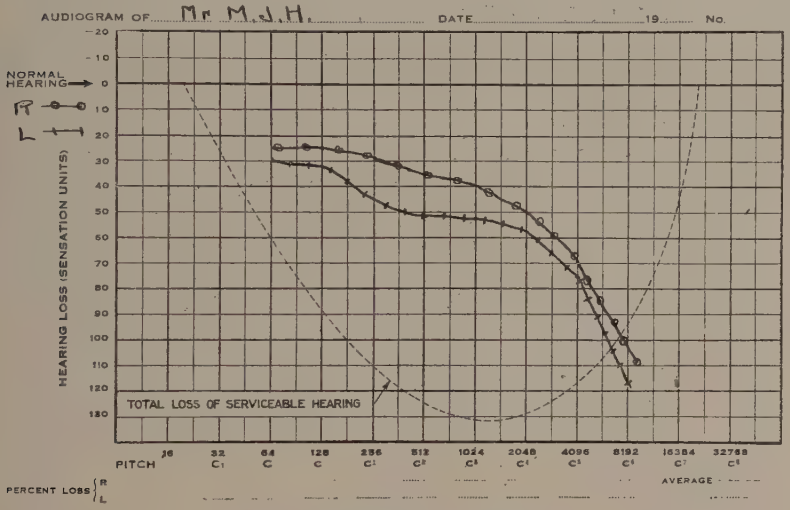


Fig. 2. Perception Deafness.

This patient, a business man, age 46 years, states that about four years ago he suddenly had pain in and around each ear. This condition was diagnosed as neuralgia by the family physician and persisted for about three weeks. Shortly after this time he became aware of the fact that the right ear seemed to be quite deaf and a few weeks later the left became similarly affected. At the beginning of this condition he had no tinnitus of any sort but now occasionally has some high-pitched tinnitus which he cannot lateralize to either ear but says it seems to be in his head. Patient has never had discharge or other difficulty with his ear. There is no history of deafness in his family. Paracusis Willisi negative. Patient denies venereal infection.

A diagnosis of probable syphilis was made from this record and the patient sent to the laboratory for Wassermann. Reaction return four plus.

PRACTICAL APPLICATION.

There are some definite deductions, dependent on clinical and pathological changes that have made it possible to lay down certain principles for the differential diagnosis of a defect in hearings:

1. *Conduction Deafness.* Where there is a defect, even of slight degree, in any part of the conducting mechanism of the ear, such defect will be definitely graphed on the chart by a reduction in the perception of the lower-pitched tones in the hearing range. In defect of the sound-conducting apparatus, therefore, we must expect to find a deflection from the normal hearing line in the low-pitch

range; the graph in the high-pitch range will still approximate the line of normal hearing.

2. *Perception Deafness.* In perception-deafness or nerve-deafness, there will be a diminished appreciation for the high-pitch tonal range and where there has been sufficient pathology developed, the upper range may be distinctly curtailed; in other words, in nerve-deafness the perception of 16,000 d. v. may be entirely lost and at

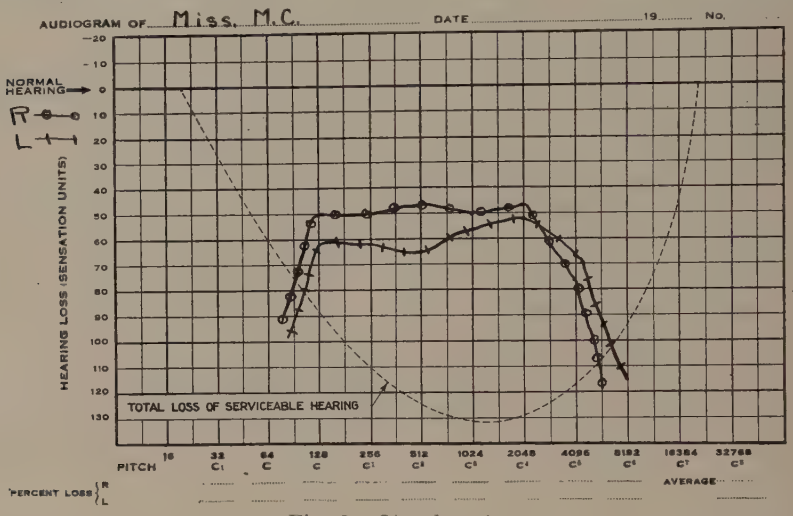


Fig. 3. Otosclerosis.

This patient, age 31 years, comes in complaining of tinnitus, bilateral, and progressive deafness. She has never had a suppuration in either ear and both ear-drums are normal save for slight loss of luster and retraction. She states that about five years ago she began having high-pitched noises in each ear. Following this it was only a short time until she became conscious of the fact that she did not hear as well as formerly. The deafness has been progressive and the tinnitus is still present. There is no family history of deafness that she is aware of. Paraceusis Willisi is very marked in this case.

that the balance of the tonal scale all the way to 32 d. v. may still approximate the line of normal hearing.

Another observation which the audiometer makes definitely possible is the reduction in the upper tone limit for otherwise normal-hearing individuals over the age of fifty, due to bone rarification and to a natural reduction in sensitivity in the auditory end-organ.

3. *Otosclerosis.* One of the landmarks in clinical otosclerosis that has been deduced by means of tuning-forks is the reduction in sound-perception for both ends of the tonal scale. In a classic audiogram of otosclerosis there will be found a reduction of sound perception for the entire tonal scale with an absence of tone-perception for 32 d. v. and, in some instances, of 64 d. v. of the lower tonal range and a similar absence of tone perception for 8192 d. v. and even 4096 d. v. of the upper tonal range. In many cases the audio-

gram will indicate the degree and profundity of the otosclerotic process.

4. *Congenital Deafness.* The introduction of the audiometer offers us an additional means of determining the absence of residual hearing in congenitally deaf children, the degree and limitations of this type of deafness and the area of the tonal range in which this deafness is most profound.

The speech area, that part of the tonal range in which the human voice in its various combinations of vowels and consonants, of modulations and pitch, is produced, lies within the limits of 300 d. v. to 3,000 d. v. When a congenitally deaf child, tested with a high-powered audiometer intensified to 200 dynes, no longer evinces tone perception within this speech area of 300 d. v. to 3,000 d. v., we must, from a utilitarian point of view, pronounce this child supremely deaf and unfit for re-education or restimulation by any form of sound amplification either of voice or instrument.

When, however, our diagram indicates that even at 120 dynes of sound intensity we secure a positive graph within the speech area in a deaf child, we feel that there may still be some stimulation or re-education developed that may prove of practical value.

5. *Tone Islands and Tone Gaps.* It has recently been asserted that there is no such thing as a tone-island or tone-gap. Thirty years ago Bezold, in an important monograph, claimed the presence of tone islands in various groups of congenitally deaf children tested with infinite pains by means of his continuous series of tuning forks. During the past thirty years we have substantiated this important observation by means of the Bezold series of forks and a specially-constructed harmonium of six octaves on the musical scale. Not only have we indicated the presence of tone-islands and tone-gaps by these functional tests, but by re-education by means of voice and musical stimulation these tone islands have apparently disappeared as indicated by subsequent tests. Whether such special stimulation as set forth in my work for over twenty-five years with the Acoustic Method has caused changes in the cochlea or whether there has been an intensive stimulation or e-education in the cortical auditory field, does not enter into this discussion.

Since the introduction of the audiometer, I have been puzzled by a peculiar incident in the audiogram for which I can find no other reasonable explanation than that of the tone-island, based on the Helmholz theory of the selective function of the ganglion cells and the hairs of Hensen in the organ of Corti. The number of cases graphed in suspected tone-islands is still comparatively small, but there seems, even in this small group, to be a fairly constant factor

leading to the conclusion that the sharp dips in the audiogram may be compared to the inability to hear certain pitched tuning forks or notes of the harmonium in the musical scale, nor can I account for the fact that this dip in the graph occurs most frequently in the pitch area of c^5 (4096 d. v.); this is just above the upper limit of hearing for the human voice and about the end of the middle whorl of the cochlea. In only one case thus far have I found a second dip in the graph of lesser hearing loss at about c^3 (1024 d. v.). These extreme and sharp dips in the audiogram must have some definite significance and give promise of interesting research.

Another explanation that may be offered for the sharp dip in the audiogram in the upper tonal range ($c,^5$ 4096 d. v.) may be found in pathological changes taking place on or about the fenestra rotunda. Thickening of the mucosa lining the cavum tympanum found in conjunction with exudative or suppurative processes or even the repair processes that follow a carefully exenterated tympanic cavity during radical mastoid operation, with consequent changes in the surface or substance of the membranous covering of the fenstra rotunda may prove to be one of the causative factors in this peculiar dip in the graph.

6. *Hearing Progress Record.* We have all been mindful of the inaccuracies in our records of functional tests of hearing. Whether we test by voice, whisper, watch or tuning fork, there are innumerable inaccuracies that make it difficult for us to follow the progress of our cases. The audiogram meets this difficulty definitely, for by means of repeated graphs we are in a position to determine definitely whether the hearing of the patient has improved or deteriorated and to what degree. Furthermore, we are in a position to intelligently discuss a patient's hearing defect with a brother-otologist elsewhere and to accompany our clinical case-record and observations with a diagram that will at all times present a definite status of the case, standardized and understood.

In conclusion, I think we are in a position to state that for accuracy, practicability, uniformity of results an potentialities, the audiometer is destined to supersede all previously recognized instruments in arriving at a definite status of the hearing function throughout its full range from normalcy to total deafness.

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PRIMARY DIPHTHERITIC OTITIS MEDIA.

Dr. J. Frank Friesen, Los Angeles.

Primary diphtheritic otitis media appears in the literature from time to time, but its occurrence is very rare.

In the standard textbooks on oto-laryngology, reference is made of a Klebs-Loeffler infection of the ear appearing in the course of a pharyngeal or nasal diphtheria, but a primary diphtheritic middle ear infection is scarcely mentioned.

Kerrison, in his work at the Willard Parker Hospital for infectious diseases, has made the observation that at least 5 per cent of all cases of diphtheria develop some form of acute tympanic disease. Duell states that it occurs in 10 per cent of all cases of diphtheria.

While only a small percentage of these aural complications are true diphtheria, the Klebs-Loeffler bacilla are usually associated with the streptococci and other organisms, that are responsible for the otitis.

Non-virulent diphtheria bacillus are frequently carried in the throats of healthy individuals and it has been found by various observers that a middle ear infection may be caused by a non-virulent Klebs-Loeffler infection.

Dr. Mellinger recently reported that he had seen eleven cases of non-virulent diphtheritic infections of the middle ear. He further reported that he had seen but one primary infection of the middle ear for which virulent diphtheria bacilli were responsible.

If aural discharge were cultured routinely by the attending physician, the Klebs-Loeffler organism would be found more frequently, especially the non-virulent type. The two cases reported here were primary diphtheritic middle ear infections without nasal or pharyngeal involvement. Their virulence was so marked, that they undoubtly would have proven fatal without the recognition of the nature of the infection, and the prompt and generous use of the diphtheritia antitoxin.

Report of cases: *Case 1:*—Dr. R., a dentist by profession, married, age 34 years, was referred to me by Dr. Clarence R. Welfer in January, 1924.

Past History: He had measles and pneumonia at 15. During childhood a mild attack of pulmonary tuberculosis. In recent years there has been a chronic atrophic rhinitis.

Editor's Note: This mss. received in The Laryngoscope Office and accepted for publication Mar. 30, 1925.

Present Illness: Jan. 21, 1924, the patient reported at Dr. Welfer's office with a mild nasopharyngitis. Five days later while at a seaside cabin he felt twinges of pain in the left ear, which became severe during the night. Toward morning the ear discharged, giving him considerable relief.

The following day he was examined by Dr. Welfer. There was a profuse watery discharge from the left ear. The nose and throat were negative. Pulse 84, temperature 99,° heart, lungs, abdomen and extremities negative.

Jan. 28, two days after the acute onset, the patient began to feel ill, the aural discharge still being profuse, and of a watery character.

At this time his wife complained of a sore throat, with mild febrile symptoms. The examination showed inflamed tonsils with white spots. The culture was positive for the diphtheria bacillus. She was given 20,000 units of diphtheria antitoxin and the throat cleared very promptly.

Jan. 29, the patient with the ear infection appeared more toxic. Pulse 102, temperature 101.° blood pressure 90/70. The secretion from the ear was still of a serosanguinous character, containing flakes of white fibrin. There were patches of a white exudate in the canal at this time, which were removed with a swab. The nose, nasal vault and throat were examined thoroughly but no evidence of a diphtheritic exudate was found. On account of an atrophy in the nasal passages, it was very easy to make a thorough postnasal examination.

Cultures were taken from the ear, nose and throat. The ear was positive and the nose and throat negative for the diphtheria bacillus. Repeated cultures were taken with the same results. He was immediately given 20,000 units of diphtheria antitoxin subcutaneously.

The patient was rapidly failing. Pulse 114, temperature 102.° The fundus of the canal and the membrana tympani were covered with a white exudate. The discharge ceased without a recurrence of pain. There was a pronounced bulging of the membrana tympani, and it was decided to enlarge the small perforation to enlarge the opening. We noticed that the appearance of bulging was not due to a distention in the tympanic cavity, but an edema or thickening. By means of a sterile glass pipette, pushed through the opening in the membrana tympani, a specimen for culture was taken directly from the tympanic cavity. This also showed the presence of the diphtheria bacillus. The patient continued failing and his condition was critical; pulse 120, temperature 103,° blood pressure 60/40; 20,000 units of antitoxin were given intravenously, followed in 15 minutes

by a violent chill and convulsions, when cardiac stimulation became necessary. A few hours later 40,000 more units were given subcutaneously, preceded by 8 minims of adrenalin chlorid. There was a slight shaking and twitching, but no actual chill followed. After having received 80,000 units of antitoxin, his condition improved. The patient made a rapid recovery. The ear was dry in less than three weeks.

Case 2: Past History: Adult male, age 23 years. During childhood he had a postscarlatinal ear infection which discharged intermittently for several years. Since that time he has had no ear symptoms except when driving in the wind or swimming, there is an unusual sensitiveness.

Present Illness: Sunday, Aug. 24, 1924, while swimming, water entered the left ear, which caused a few days of pain and discomfort.

The following Sunday, he went swimming again and a few days later awakened with a sensation of fullness as though there was fluid in the ear. This was associated with malaise and headache.

He consulted Dr. Welfer and was referred to me for examination. There was a profuse watery discharge. An inspection of the canal revealed the absence of the membrana tympani, having been destroyed in the scarlatinal infection during childhood. The tympanic cavity did not show any exudate, but the profuse watery discharge aroused our suspicions on account of the experience with the previous case, and a culture was made to determine the organism. The following day the culture was reported positive for the diphtheria bacillus. At this time a white fibrous exudate covered the canal and the tympanic cavity. The patient felt ill and appeared toxic, pulse 96, temperature subnormal, blood pressure 90/70. He was given 40,000 units of antitoxin intramuscularly, a general collapse followed and stimulation became necessary.

Several hours later an additional 20,000 units were given. A temperature ranging from 99 to 100° followed for several days, after which his recovery was uneventful.

The outstanding features about these two cases were:

1. The extreme virulence of the infection.
2. The edema and swelling of the membrana tympani in the first case.
3. The profuse serosanguinous discharge throughout; later containing flakes of diphtheritic membrane.

711 Merritt Building.

A CASE OF ATRESIA OF VOCAL CORDS.

Dr. G. M. Van Poole, Honolulu, T. H.

S. T., age 18 years, came to see me on Feb. 5, 1925, for nasal trouble. The nasal cavities contained pus which could be seen coming from region of ostia of ethmoids, both sides. I noticed he was

hoarse but had a fairly good voice. He said the hoarseness had existed from childhood and he had never had any soreness of throat that he could rememeber.

Upon examining throat with laryngeal mirror, I noticed that both vocal cords seemed to be to the left of the opening into the trachea.

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I then cocainized his throat and made a thorough examination with Jackson's laryngoscope and found that both cords were united in their entirety with a slit-like opening to the right side of the cords. He breathed and phonated through this slit. I have tried to draw in Fig. 2 the way his throat looked when breathing naturally. Fig. 1

is a rough reproduction of an ordinary throat showing the normal chink of the glottis.

This case seems to be a congenital condition. There is no history of injury or disease that would cause such a deformity and the tissues look healthy with no old scars.

Young Building.

A BRONCHOSCOPIC OR ESOPHAGOSCOPIC SPECIMEN COLLECTOR.*

Dr. Louis H. Clerf, Philadelphia.

Collection of pus or other secretion from a bronchus or from the esophagus is often resorted to for bacteriological or chemical studies or for making a vaccine. At times the quantity is very small and none can be obtained at the proximal end of the ordinary aspirating

tube if it is of a large lumen. To obviate this the collector with a detachable reservoir was devised (Fig. 1). The collector can be attached to the negative pressure tube of an ordinary suction apparatus. When collection is completed the reservoir is detached and the specimen transferred to a sterile test tube. The entire apparatus can be sterilized by boiling.

*Read before the Philadelphia Laryngological Society, Oct. 16, 1924.

AMERICAN BOARD OF OTO-LARYNGOLOGY.

An examination was held by the American Board of Oto-Laryngology on May 26, 1925, at the Medico-Chirurgical Hospital, Philadelphia, with the following result:

Passed—137
Failed— 20

Total Examined—157

The next examination will be held at the University of Illinois School of Medicine on Oct. 19, 1925. Applications may be secured from the Secretary, Dr. H. W. Loeb, 1402 South Grand boulevard, St. Louis, Missouri.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, December 29, 1924.

(Continued from June issue.)

Dr. Heller said he had been much interested in the case as he had seen five of the same type, four of the patients having sinus thrombosis. The fifth case had not been directly under his care, but Dr. Roth had asked him to see it. It was very similar to Dr. Harris' case: it started with a furuncle, which was incised and spread and the patient had a cellulitis of the face and was in the hospital three or four days, the whole condition lasting for a week or ten days. The abstinence from incision does not, however, lead to a solution, for the first case that he had seen was that of a young man from California who had tuberculosis and came East with a pimple in his nose, which was treated by his family physician with ordinary household remedies, no incision being made. Later the young man lost the sight of his eye and Dr. Heller was called in to see him, and found signs of sinus thrombosis; the eye beginning to obtrude and the sight was entirely gone; he died in about two days. The other three cases Dr. Heller thought had been incised, two of them certainly. Only that morning a man had come in with such a condition, which had not been incised but had been treated with something to give relief. Fortunately many of these cases are not serious, for furuncles of the nose are not uncommon, and it is not unusual for persons to pick them. However, it is an alarming and a very serious and tragic thing to have a patient come in with what appears to be an ordinary furuncle and yet die from it—and it is very important to know how to avoid such consquences.

Dr. Herzig stated that now was using acriviolet solutions exclusively in the treatment of nasal furuncles. The last three cases treated by him the solution of 1 to 200 acriviolet was applied upon cotton after penciling the furuncle with the solution first and giving the patient some of the solution home and having them apply it themselves every three hours. In this way he has been able to abort the last three cases. The time required was twenty-four to forty-eight hours. The method used was that of Dr. Joseph Abraham, who reported a considerable number of cases in which this drug was used. What had been said about the intravenous use of mercurochrome interested him very much as although he had no occasion to use same for a septicemia following furuncle, he he injected a case for Dr. Walscheid, whose patient had a streptococcus infection of the arm and he was going to amputate. In this case it prevented amputation. The second case that he had advised its use in answer to an inquiry by Dr. Neumann, who had a case of septic pneumonia of streptococcus origin (who will report same later). In both of these cases there was no doubt that the use of the mercurochrome saved their lives. The best way to use it is to *inject slowly.* He would not like to see it used in a case of acute endocarditis (of his). The men should not become discouraged if their first case dies, but continue to use it in appropriate cases.

Dr. Voislawsky said he had been much interested in what had been said by Dr. Heller and Dr. Herzig. He had himself seen five of these cases in the last three to five years, three of which proved fatal, and in two there was a terrible struggle to save the patients. The incisions were made practically as in Dr. Harris' case, and after a long siege they

got well. Dr. Heller had sounded the keynote. The patient comes in with a simple furuncle, a boil, and this condition develops and in a very short time the patient is apt to pass out. He had purposely added a report, though not in detail, of these five cases, as a note of warning for the protection of the nose and throat man who sees these cases. One seldom hears of lawsuits that are brought against colleagues until the suit is over, and often the records or reports are not searched prior to such a suit, and it was mainly on that account as well as to report the cases that he has spoken.

Dr. Phelps told of a case that had not been incised, the patient being moribund from meningitis when he saw him. He always incises them, but the thing that is most important in all infections is to do it with the least possible traumatism; squeezing is liable to be fatal, but if it can be done gently it is much the safest way; even the injection of cocain may traumatize or devitalize the tissues, but he would certainly incise them. If any aneshesia is found necessary, nitrous oxide is best.

Dr. Yankauer said it had been his custom to refrain from incision until the furuncle has pointed and not to extend the incision into the inflamed tissue, the idea being to remove the pus without exposing fresh tissues to infection. Recently he had had occasion to treat a patient for a furuncle which had penetrated the cartilage and was liable to rupture on the outside, and the patient was very anxious to avoid an external opening. She devised her own way of making wet applications, which was clever and very satisfactory; she made up the solution in a tumbler and stuck her nose into it; she kept this up all day until the abscess got well.

Dr. White thought the discussion was valuable in bringing out the desirability of avoiding the old-fashioned wide opening or the crucial incision.

Dr. Phelps agreed with Dr. Yankauer that one should wait until the furuncle points and then make the incision as gently and conservatively as possible, avoiding squeezing or pressure on the inflamed parts.

Dr. Harris said that the subject was one which at first blush might seem so simple as hardly calling for discussion, yet perhaps there was nothing so apparently simple that had such possibilities of a serious termination. The very pertinent remarks of Dr. Voislawsky and Dr. Phelps had reinforced what had been brought out and were in line with the conclusions resulting from his investigations and inquiries among the general surgeons. The desire to go in and do a complete surgical operation is apt to be followed by dire results. Many cases do get through without untoward results; but there are many histories on record where active treatment has brought about a condition like this case, immediately followed in twenty-four or forty-eight hours by cellulitis, temperature, etc. When a furuncle is ripe, then open it with as little traumatism as possible and no expression at all. It is still better to attempt to abort it and prevent it from going on o where surgery is required.

A New Separator for the Nasal Crest in a Submucous Operation. Dr. A. J. Herzig.

I present for aproval and criticism a new instrument that I have devised for the separtion of the mucoperi-chondrium of the nasal crest during a submucous operation. Doubtless all of you have separated the mucoperi-chondrium from the crest and upon attempting to remove same have found some fibres of the mucoperi-chondrium adherent. Tieck's separator is the best that has been devised so far, but it only separates to the cut anterior edge of the cartilage. The instrument presented separates beyond the anterior cartilaginous incision and so insures a better separation as it separates further forward. The instrument may not be used until a piece of cartilage has been removed by means of the swivel knife or other instrument, as it is too wide to be introduced before. It may also be used to separate posteriorly. The shape of the

instrument prevents perforation of the mucoperichondrium. The instrument has a suitable handle, 4 inches long, a steel shaft 2½ inches long by .102 inch diameter, the distal end terminating in a hook formed by a returned bend of the shaft parallel horizontally with an open space ⅛ inch wide by $\frac{5}{16}$ inch (anteroposteriorly) long. The hook ends in a vertical arm ⅜ inch long by .091 inch diameter. They are made right and left.

A Device for Applying Radium in Carcinoma of the Oesophagus and Cardia. Dr. Sidney Yankauer.

Dr. Marvin Jones inquired whether the radium emanations were used in the form of seeds, and told of the laboratory in Buffalo where radium is used in that manner, putting in a number of seeds where radium is called for. At that time they thought the slough resulting was due to an infection, but since then they have come to feel that it is due to necrotic tissue.

Dr. Harris replied that the radium used had the outward appearance of a radium needle, and was not the usual seeds, as he understood it. He had the impression that these burns from the emanations were of not infrequent occurrence, and that this was not a unique case. The doctors whom he had consulted thought that the burn was due to the strength employed. The case was not considered cured, by any means; the throat seemed to be all right, but there was still complete obstruction of the nose, and this extraordinary thing had taken place; instead of the soft tissue there was now this hard bony tissue in the nose. The macroscopic picture had changed since a year and a half. It had been his purpose to go on further with radium until this new appearance took place in the pharynx. In the meantime, the child looked perfectly well, and had no enlarged glands, the blood count was normal, and there was no leucocytosis, but nevertheless the internists made the diagnosis of Hodgkin's disease.

Dr. G. A. Robinson: Radium is employed for two purposes; one for the complete destruction of tissue, which is termed the caustic effect, and, the other purpose is for growth restraint, and is used when the growth is too large to permit of complete disintegration by the caustic method. In this instance there was overaction and destruction of tissue, the dosage being approximately four times that of a growth restraint dose, which would produce only cell change without necrosis.

Radium emanation is ordinarily used in the form of bare glass tubes, which are inserted into the tumor by means of a trochar needle, and are allowed to remain *in situ*. However, the emanation or Radon may be screened with various thicknesses of metal as is the radium element. The screenage of radium needles is from 0.2 to 0.4 m.m. of platinum or nickel-steel and cuts off most of the beta rays, which are irritating, the hard beta and gamma rays being employed. One millicurie of Radon is equivalent to 133 mc. hrs.

A New Tonsil Irrigator. Dr. Sidney Yankauer.

DISCUSSION.

Dr. Heller wanted to know if this irrigations were to be used in children as well as adults. He found that pain was largely due to allowing throat to become dry, and then the muscular effort on this dry throat caused a great deal of pain and that was partially overcome by giving the patient quantities to eat. Dr. Heller said that he had never given irrigations, mainly because he found that the family could not handle them. For the last two years he has used a gargle made of equal parts of aspirin, sodium bicarbonate and powdered acacia, peppermint oil, 10 drops to ounce, a teaspoonful dissolved in a glass of water, and directing the patient to swallow half of it. That gives the patient 5 grs. of aspirin every two hours and affords great relief. Dr. Heller said he was very glad to hear what Dr. Yankauer had said about the irrigation of throats and believed this new instrument would facilitate irrigations materially.

Dr. Jones said he was interested in what Dr. Heller had said about the gargle, for he had a preparation of aspirin and soda bicarbonate combined in a tablet under the name of the Post-Graduate Hospital Gargle.

Dr. Phelps said that Dr. Yankauer had emphasized the fact that he used only plain water for the irrigation, no salt or soda. He had himself employed irrigations but always with salt or soda added.

Dr. Harris said it seemed a far cry from irrigation to spray, and then told of a physician he had met during the summer who said that he had lost patience with his patients' complaints of pain. He had his own tonsils taken out later and used a spray containing aspirin, was back in his office the next day, and really had no pain at all. One of his house men had been keeping a record of cases treated with aspirin spray, and stated that fifty to seventy-five cases had been so treated, with uniformly good results, little pain and dysphagia. It was questionable whether irrigation would produce the same good results in so convenient a way as a spray or gargle. Dr. Harris said that he uses a spray in his own cases, but that he was much interested in Dr. Yankauer's remarks, for it was certainly most unsatisfactory to see a patient the day following operation and hear his complaints of suffering.

Dr. White expressed pleasure that this subject had developed, for it is getting to be a rather common practice among the laity, after the tonsils are removed, to get aspirin tablets from the druggist. He had seen cases of near collapse apparently from the use of aspirin by patients who said they had taken a tablet "once in a while" during the day.

Dr. Heller, commenting on Dr. White's remark, said that all aspirin is not the same, and that he always specified Squibb's product when ordering it. Some of the aspirin on the market it not safe to take, and that was probably what was the matter in the cases reported, not the aspirin.

Dr. Yankauer said he did not employ irrigation with children for it was almost impossible to control them, but used it with adults, who could irrigate the throat as often as it hurt them; they reported that the relief of the pain following the hot irrigation was very satisfactory. In that way he gets along without the use of drugs. He had used aspirin, knew that it had a very decided local anesthetic effect, but he had an idea that it delayed the healing of the wound. He uses plain water because he doesn't see any advantage of either salt or bicarbonate of soda in the mouth. The heat and the getting rid of the mechanical particles of food aws the main thing desired. Besides the relief of pain there was another decided advantage in the irrigation treatment: it usually requires about two weeks for the parts to heal—there is an exudate in the throat and an open sore, and there is danger of a late secondary hemorrhage ,etc., so that the more quickly the parts are healed the better for the patient. This can be accomplished in two-thirds of the time with hot irrigations.

SECTION ON OTOLOGY.

January 9, 1925.

Recently Observed Cases of Intracranial Complications Following Acute and Chronic Middle Ear Infections. These cases of otitic complications are presented from the service of Dr. I. Friesner, Mount Sinai Hospital.

1. Case of Brain Abscess of Otitic Origin. Cured. Dr. S. Rosen.

Case 1. John M., age 51 years; admitted June 21, 1922; discharged Aug. 4, 1922.

Patient admitted to Mount Sinai Hospital, Neurological Service, with history of acute purulent otitis media ten weeks before. The drum was

incised at that time and the ear discharged continuously until ten days before admission, when the ear became dry. For seven weeks before admission the chief complain of the patient was headache localized to the right side. About the time the ear stopped discharging the patient vomited and became unconscious for three days. No convulsions. On admission the patient was facetious at times, dull and apathic. Fundi negative. No elevation of temperature. The right tympanum showed a loss of lustre but was otherwise negative. All the landmarks were visible. No evidence of mastoiditis.

The spinal fluid came out under slightly increased pressure, was clear and contained 300 cells; polys and lymphacytes in equal numbers.

The neurological signs of intracranial suppuration became more evident; there was increasing stupor; left facial weakness, left ankle clonus and left Babinski. On June 27, six days after admission, the right temporosphenoidal lobe was explored by Dr. Friesner through a trephine opening. A large temporosphenoidal abscess was found and drained. The patient made an uneventful recovery, was discharged on Aug. 4, 1922, and has been well ever since.

Fully resolved middle ear, development of a right temporosphenoidal abscess. Patient well two and one-half years since operation.

2. **Case of Uncomplicated Mastoiditis with Optic Neuritis.** Dr. S. Rosen.

Case 2. Harold G., age 12 years; admitted Sept. 3, 1924; discharged Sept. 18, 1924.

Patient admitted to Mount Sinai Hospital with history of bilateral earache for ten days after swimming. One week before admission a double paracentesis was done, the ears discharging since then. On admission the patient presented a rather unusual clinical picture. He was dull, torpid, responded slowly and was irritable. Temperature 99.5,° pulse 60. Lumbar puncture negative.

Right ear: Thin serous discharge, moderate in amount, drum thickened. Landmarks not visible; hearing markedly impaired; slight tenderness over tip and antrum.

Left ear: Similar to findings.

Blood count: 9,000; 62 per cent polys.

The fundi showed a beginning optic neuritis. The mental condition continued; temperature remained below 100° throughout and the bracycardia, 50/60 persisted. Three days after admission the signs of mastoiditis became definite and a bilateral simple mastoidectomy was done by Dr. Maybaum. Soon after the operation the mentality of the patient became normal and he made an uncomplicated recovery except for the persistence of the bilateral optic neuritis for eight weeks.

The bacteriology of the mastoids was pneumococcus-indeterminate type.

Comment: History of bilateral mastoiditis due to pneumococcus infection with pronounced mental disturbance, low temperature, bracycardia, bilateral optic neuritis are the salient points in this case. Clinically before operation the picture was that of a streptococcus mucosus mastoiditis with intracranial complication. Optic neuritis in a case of uncomplicated mastoiditis is an unusual finding.

3. **Case of Sinus Thrombosis.** Dr. S. Rosen.

Case 3. Ida S., age 10 years; admitted Mar. 3, 1924; discharged Apr. 11, 1924.

Patient was admitted to Mount Sinai Hospital with history of pain in right ear for ten days and discharge for four days following a spontaneous perforation of the right drum. After two days in the hospital the signs and symptoms of acute mastoiditis became definite and a simple mastoidectomy was done. The cells were broken down, granulations and pus present. The sinus plate was intact and apparently normal. The usual postoperative rise of temperature to 104° took place, but instead of declining, the fever remained high, between 102 and 104.5° for eight days. The only physical findings to account for this was a well marked cellulitis of the scalp, not red, not particularly tender but

with marked pitting. The child did not look sick, sat up in bed, was playful, ate well and slept well. However, during the ensuing week, the ranges of temperature were much greater being 99° in the morning and 105° in the evening, at one time reaching 107,° and with this a recession in the cellulitis of the scalp. The hemoglobin was steadily decreasing, being 80 per cent after the simple mastoidectomy, until on Mar. 22 it was 66 per cent, with persistently negative blood cultures. A sinus exploration was evidently indicated. Blood counts varied between 15-20,000; 75 per cent polys. Jugular ligation and sinus operation was done by Dr. Maybaum. The apparently healthy sinus plate was removed, and a gush of pus was seen coming from the sinus; a purulent thrombus was removed, free bleeding being obtained from bulb and torcular ends. Following the operation 300 c.c. of blood was given the patient by the Unger method. The temperature gradually returned to normal. One week after operation temperature reached 101° and blood culture revealed hemolytic streptococci for the first time. However, the general condition steadily improved. Following this the temperature remained normal and the blood cultures were negative. Patient discharged well.

Pathological report: Purulent thrombus, hemolytic streptococcus.

Comment: The interesting feature in this case of sinus thrombosis is the persistent negative blood cultures during the disease, and the positive blood culture one week after operation. Recovery without further operation.

4. **Case of Sinus Thrombosis Complicating Acute Exacerbation of Chronic Middle Ear Suppuration Due to Bacillus Proteus.** Dr. J. L. Maybaum.

Case 4. Hyman R., age 18 years; admitted Dec. 22, 1922; discharged Feb. 8, 1923; well; uncomplicated recovery.

Patient admitted to Mount Sinai Hospital with a history of chronic discharging ear of two years and an acute exacerbation of three days duration.

On the following day, Dec. 23, a radical mastoidectomy was done and a huge perisinus abscess involving almost the entire lateral sinus in its mastoid course was found. There was a cholesteatoma in the antral region. Culture of mastoid showed streptococcus overgrown by Gram Negative Bacillus. The patient ran an uncomplicated postoperative course for forty-eight hours, the temperature gradually receded from 102.4° on admission to 99.°

Suddenly the temperature rose to 104° and the patient had a chill lasting 4 minutes. This was repeated on the following day, after which the temperature remained down for four days. Blood cultures were repeatedly negative. Then the temperature rose again critically and became septic with repeated chills for three days.

On Jan. 3, the jugular was ligated and the sinus explored by Dr. Maybaum. An obturating purulent thrombus was found.

Pathological report: Inflamed sinus wall with purulent exudate.

Culture (thrombus): Pure culture of bacillus proteus.

Comment: This case is of interest, as sinus thrombosis in which the infecting organism is B. Proteus is extremely rare. B. Proteus is usually considered to be of low virulence; it may appear in the blood at the end of an exhausting illness by invasion from the intestines. When found in chronic suppurative otitis media of long standing, it is probably a secondary invader after the original invader has disappeared. Green and exceedingly foul-smelling pus is characteristic of these cases.

In the case reported, the B. Proteus while present in pure culture in the purulent thrombus removed from the sinus, was not recovered from the blood. The few cases of bacteremia due to B. Proteus have all been fatal. Dr. Kernon, a few years ago, reported before this Section two interesting cases of this kind.

5. **An Unusual Case of Sinus Thrombosis (Primary Bulb).** Dr. J. L. Maybaum.

Case 5. Adolph C., age 15 years; admitted Jan. 19, 1924; discharged Apr. 4, 1924.

Patient admitted to Mount Sinai Hospital complaining of earache, drowsiness and buzzing in the right ear for one week. Three days before admission there was a spontaneous, painless perforation of the right drum with medorate purulent discharge. The boy looked sick and had a temperature of 105.4.° There was a slight thin purulent nonpulsating discharge from an anterior perforation, drum being flat, landmarks visible; no sagging, hearing moderately impaired; the middle ear evidently resolving. There were glands palpable at the angle of the right jaw. Blood count 22,000 with 88 per cent polys. Fundi negative.

At 2:30 p. m., the following day, the patient had a chill, the temperature rising to 106.2,° and it was decided to explore the sinus, there being nothing else to account for the clinical course. A shower of subcrepitant rales appeared in both chests anteriorly. The operation was deferred in as much as it was thought that the patient had developed a pneumonia. The blood culture taken on admission was still negative. On the morning of the third day of the patient's admission to the hospital it was noted that there was a beginning optic neuritis, bilateral; the blood culture of the second day was reported positive hemolytic streptococcus. The signs in the chest remain the same; the clinical picture was not one of pneumonia. On Jan. 22, three days after admission, the patient was operated on by Dr. Maybaum. The mastoid was apparently free of pathology. The sinus plate was intact. When the sinus was uncovered pus was seen exuding from it. The jugular was ligated. The pus yielded an hemolytic streptococci.

The temperature remains septic after operation. The chest signs continued diffuse, occasionally the patient spat up blood-tinged sputum. For the next four weeks the temperature remained high, the chest signs persisted and there developed a metastatic arthritis of the left shoulder which subsided, and a large deep abscess of the buttock was opened and drained. The blood culture was positive only once during the interval. Gradually the temperature came down to normal. The chest signs disappeared. The general condition improved, and the patient was sent to the country. He returned three weeks later, well.

Comment: The predominant feature of this case of primary jugular bulb thrombosis was the occurrence of a severe, metastatic, bilateral pulmonary involvement.

6. **Case of Acute Mastoiditis with Bacteremia of Unassignable Cause.** Dr. J. L. Maybaum.

Case 6. Harry Z., admitted Nov. 1, 1924; discharged Dec. 29, 1924.

Patient admitted to Mount Sinai Hospital with a history of pain in the left ear and discharge for six days after paracentesis. After one week's observation the signs of acute mastoiditis became definite and a simple mastoidectomy was done. Blood count 18,000; polys. 75 per cent. Granulations and pus were found in the mastoid. Five hours after operation the patient had a chill lasting five minutes, with a rise of temperature to 104.° Blood culture taken was negative. On the following morning beginning cellulitis of the neck below the mastoid wound was noted. For the following five days the temperature gradually receded in step-like manner to 100° and the cellulitis had apparently disappeared, but deep pressure on the neck caused a gush of pus through the lower angle of the mastoid wound. There was then a sharp rise to 105,° and blood culture at this time revealed 144 colonies, hemolytic streptococci. On the following day the temperature again reached 104° from 100,° and the blood culture showed only one colony of hemolytic streptococcus. On Nov. 17, crucial incisions were made in the neck by Dr. A. V. Moschowitz, a great deal of pus, muscle and facial necrosis being present. No gross evidence of phlebitis. The next day the tem-

perature was not so high and the blood culture revealed one colony of hemoyltic streptococcus. During the four succeeding days with temperature ranging from 100° to 103° daily, the blood cultures were sterile. The temperature then began to oscillate between 99° and 102° daily, with a reappearance of streptococci in the blood, from one to three colonies being present. With the neck infection clean and no local evidence to account for the persistent bacteremia, it was decided to uncover the sinus and explore it if necessary. Accordingly on Dec. 3, the sinus and its mastoid course was uncovered and appeared normal. Nothing further was done. Two days later the temperature reached 101° and the hemolytic streptococci were present in glucose bouillon flask only. The general condition of the patient was excellent, the neck wounds were healing, the temperature came to normal and remained so, the bacteremia ceased and the patient was discharged well.

Comment: The occurrence of a neck infection secondary to simple mastoidectomy with development of a bacteremia are the interesting features in this case. Bacteremia was due either to a sinus thrombosis which healed spontaneously, or the result of thrombotic process in the smaller veins in the neck.

7. **Case of Sinus Thrombosis Complicated by Metastatic Emypema with Sontaneous Recovery.** Dr. J. L. Maybaum.

Case 7. Irving H., age 10 years; admitted May 26, 1924; discharged July 9, 1924.

Patient admitted to Mount Sinai Hospital with a discharging ear of two weeks duration; severe frontal headache for three days. The right drum was flat, moderate middle ear discharge from a postinferior perforation. No sagging; spinal fluid negative. During the three days following his admission the boy was running a septic temperature. Blood culture taken on the first day was reported positive, hemolytic streptococcus. Jugular, mastoid and sinus operation by Dr. Maybaum. The jugular was ligated. The mastoid was found to be diseased, free pus being present. The lateral sinus contained a purulent thrombus. There was no bleeding from the torcular and bulb ends. Although the condition of the patient improved after operation, the septic temperature and the bacteremia continued for a week. Thick purulent discharge could be squeezed from the neck through the bulb into the mastoid cavity. The neck wound was revised and jugular resected for about 1½ inches. Complete exenteration of the sigmoid sinus to the bulb was then done. Jugular bulb packed, wound Dakinized. The bacteremia disappeared after this. Following this the patient complained of pain in the right chest. The fever continued and signs of an effusion appeared in the right chest.

X-ray of chest showed a right-sided encapsulated empyema.

On June 26, about three weeks after operation, the patient had a paroxysmal coughing spell, expectorated about two ounces of green odorless pus, following which the chest signs disappeared. The temperature came down and the patient made a rapid recovery.

Comment: The interesting feature of this case of sinus thrombus was the development of a metastatic empyema, which ruptured into a bronchus with spontaneous cure.

8. **Case of Lateral Sinus Thrombosis Complicated by Metastatic Lung Abscess with Spontaneous Recovery.** Dr. J. L. Maybaum.

Case 8. Henry S., age 32 years; admitted July 5, 1920; discharged Sept. 9, 1920.

Patient admitted to Mount Sinai Hospital on the afternoon of July 5 with a chronic discharging ear of twenty years duration and an acute exacerbation of four days duration. The patient had two shaking chills before admission, with high temperature. Blood culture negative. The following morning a radical mastoidectomy, jugular ligation, sinus and bulb operation were done by Dr. Friesner. The mastoid was badly dis-

eased, the sinus and bulb being the seat of extensive purulent thrombosis.

Four days postoperative the temperature oscillated between 100° and 102.° On the fifth day postoperative, the patient had a chill with a rise of temperature to 104.2,° complaining of a sticking pain in the left chest. X-ray of chest at this time showed a pneumonia of the left lower lobe, although the physical signs were not typical, there being dullness, bronchovesicular breathing and occasional moist rales. These physical signs persisted for several weeks when the patient coughed up about two cupsful of purulent mucoid, odorless secretion daily.

From the onset of the pulmonary symptoms and signs up to the time of discharge from the hospital, the patient ran a temperature from 100° in the morning to 102-103° in the evening. Blood cultures still negative. On Aug. 2, X-ray of chest showed an abscess in the left lower lobe; a circular cavity 1½ inches in diameter with a fluid level.

Sept. 2, bronchoscopy showed a large amount of purulent secretion coming from the left lower lobe branch.

The patient was discharged Sept. 9, with the mastoid wound almost completely healed. Still coughing up large amounts of pus. He was sent to the country by the Social Service Department, where the pulmonary suppuration healed spontaneously and completely after a few months.

Comment: The interesting feature in this case of sinus thrombosis is the absence of positive blood cultures throughout, and development of a pulmonary abscess, metastatic, which healed spontaneously.

9. **Case of Primary Jugular Bulb Thrombosis.** Dr. J. L. Maybaum.

Case 9. Anna H., age 7 years; admitted Feb. 1, 1923; discharged Sept. 14, 1923.

Patient admitted to the Pediatric Service of Mount Sinai Hospital with history of severe pains in both legs for the past four days. Eleven days before admission the patient had pain in the right ear. The mother was assured by physician that there was nothing abnormal with the ear. The pain continued for a few days and disappeared; never any discharge. Temperature on admission, 103.2.° The physical examination revealed exquisite pain on pressure over both hips, especially the left, and over the right tarsus. The right typanum was somewhat thickened; landmarks present; no bulging and no evidence of mastoid disease. Blood culture taken at this time showed hemolytic streptococcus. The temperature remained between 102-104,° and on Feb. 5 a huge pyarthrosis of the left hip was opened and drained, hemolytic streptococci being recovered from this focus.

After this operation the temperature ranges were not so high for a few days, but again oscillated between 101° and 103,° until on Feb. 11 a pyarthrosis of the right ankle was opened and drained, yielding the same organism. Whereas the bacteremia was present persistently up to this point, the blood after this operation apparently became sterile for five weeks, during which time there was marked improvement in the general condition, except that there developed marked lumbar tenderness, especially on the right side. The right kidney became enlarged and hyaline granular casts, W. B. C. and R. B. C. appeared in the urine in great numbers. Exploration of the right kidney for subcortical abscess was negative.

On Mar 19, the temperature suddenly rose to 104.8° and with this there appeared an adenitis at the angle of the right jaw. Blood culture revealed the reappearance of hemolytic streptococci. The temperature oscillated between 100-105° for a few days. The fundi showed a bilateral choked disc O. D. 3 D, O. S. 6 D. The glands increased in size and the bacteremia became pronounced, 160 colonies per c.c. In view of the bacteremia, eye findings, cervical adenitis (angle of jaw) in the presence of normal middle ears, a diagnosis of primary jugular bulb thrombosis was made. There was no evidence of any suppuration in the middle ear at any time. On Mar. 22, the jugular right was ligated by

Dr. Maybaum, the general condition of the patient not permitting further surgical interference.

On Mar. 24, two days later, the right lateral sinus and bulb were explored by Dr. Friesner. The mastoid, the antrum and sinus plate were normal. The sinus was exposed in its mastoid course and for two inches behind the knee. On opening the sinus, an escape of pus was seen from bulb to torcular. No free bleeding. The blood culture, three hours after operation, showed 20 colonies per c.c., and forty-eight hours after operation the blood culture was sterile and remained so. The temperature came down promptly and remained normal. The papilledema gradually receded until on discharge there was a retrogressive neuritis. Patient discharged Sept. 14 with healed mastoid and cervical scar.

RESUME OF SINUS THROMBOSIS CASES.

Of these seven cases of sinus thrombosis: Six were operated upon with findings of purulent thrombus in the sinus.

One case (6) recovered without jugular or sinus operation. The bacteremia in this case may have been due to a thrombotic process in the smaller veins of the neck or the case was one of spontaneous recovery with sinus thrombosis.

1. Three cases (5, 7, 9) of the six cases operated upon had a positive culture report, streptococcus hemolyticus, before operation.

2. Three cases (3, 4, 8) were operated upon without waiting for culture report. 1. One of these (Case 3) had a positive culture for the first time one week after operation; negative thereafter. 2. One (case 4) had negative cultures throughout but purulent thrombus from the lateral sinus showed bacillus proteus. 3. One (case 8) negative blood culture throghout.

Purulent thrombus was found in cases operated upon. Five showed streptococcus hemolyticus. One case, bacillus proteus.

Five cases (3, 5, 6, 7, 9) complicated acute middle ear infections. Two cases (5, 9) were cases of primary jugular bulb thrombosis.

Two (4 and 8) cases followed acute exacerbation of chronic middle ear suppuration.

Three (5, 7, 8) had serious metastatic pulmonary complications.

One case (9) had metatasis in the joints and muscles.

Ligation of jugular vein was done in all of the cases. In one of these cases (7) a revision of the neck wound and jugular resection had to be done. Simple incision and evacuation of localized purulent collection may suffice in such cases.

Three cases (7, 8, 9), a complete exenteration of the sinus to the jugular bulb was done.

Two cases (5, 9) fundi findings were an important aid in determining the question of operative interference.

DISCUSSION.

Dr. Maybaum said that Dr. Rosen's remarks as to the value of blood cultures holds true. In the average case, unless the picture were absolutely definite and urgent, one would hardly operated without waiting for a blood culture report. Repeated negative culture findings do not necessarily exclude the diagnosis of sinus thrombosis, as instanced by a number of cases reported this evening. One must, however, at all times be guided by the clinical picture. The first case had a definite picture of a sinus thrombosis, and may have had a sinus thrombosis spontaneously cured; the entire aspect of the patient, the change in the blood findings from time to time, favored an opinion of continued improvement; it was decided not to operate, although at one time it was thought necessary. As a checkup after a sinus operation, a number of blood cultures is invaluable.

Dr. Barnert had brought out a very important point: the necessity for routine examination of the fundi in otitic cases with possible complications. As a routine at Mount Sinai Hospital, we now examine the fundi repeatedly to note early changes in the hopes of reaching earlier diagnosis in doubtful cases. Optic neuritis is present in 10 to 15 per

cent of cases of sinus thrombosis; the proportion may be higher if these examinations are frequently done by the otologist, checked up by the Ophthalmologist. In two of the cases reported this evening, positive fundus findings were an important factor in deciding upon the question of operation.

Dr. Schiller referred to a case of primary bulb thrombosis occurring in an adult; such cases are rare, they usually occur in young children. With practically negative ear history and findings, these cases are often extremely difficult to diagnose. In one of the cases reported, the bacteremia, eye findings, enlarged cervical glands at angle of jaw, even in the absence of ear findings, made the diagnosis of primary jugular bulb thrombosis certain.

Dr. Maybaum remarked that it was a relief for once to attend a meeting of this kind without the usual wrangling over the question of the advantages of jugular resection or ligation. The case cited by Dr. Scheer, of marked changes in the jugular vein, must have been quite advanced. If the vein shows macroscopic changes of disease, a resection is of course indicated. We find that a low ligation answers the purpose, only in rarest instances is it necessary to resect later.

Facial Paralysis, Perisinus Abscess and Mastoiditis iWthin Forty-eight Hours After an Acute Otitis Media. Dr. I. M. Heller.

Myron R., age 1½ years, had never been ill until the early hours of Friday, Dec. 12, 1924, when he awoke with fever and pain in his right ear. His family physician, Dr. Steinman, saw him shortly after and aside from the aforenamed symptoms could find nothing.

I saw him at three that afternoon and was told that he had rested easier for the previous hour and that the ear was discharging slightly. Temperature was 103.° From the right canal came a small amount of purulent material and the posterior portion of the drum was red and bulging. There was no mastoid tenderness or anything to suggest an abnormal case. The left drum was also inflamed, but not bulging.

As the perforation in the right drum was small, I did the usual paracentesis, which was followed by a free flow of pus. Left membrane was also incised but only bloody serum resulted. Temperature fell to 101° and patient had a fair night. The next evening, the doctor was told by the mother that the face seemed out of shape. On Sunday afternoon, forty-eight hours after paracentesiss, I again saw him and in consultation with Dr. Murray Bass, a pediatrician, and Dr. Steinman. There was complete paralysis of the right side of face. Temperature 104,° left ear dry, right ear, discharging moderately, slight sagging of post-superior wall and distinct tenderness over mastoid process. My reason for having in a children's specialist was to rule out the possibility of a polyencephalitis or other intracranial condition. After a thorough examination, Dr. Bass came to the conclusion that, although he had never seen a case of facial palsy follow so close upon the heels of an acute otitis media, he could come to no other conclusion.

Patient was taken to Lebanon Hospital at once and operated upon in an hour. On uncovering the cortex a small amount of pus was released. Tip was undeveloped and as was to be suspected, there was little destruction of bone cells. Working posteriorly, at the knee of the sinus, we came upon a dram of thick green pus under considerable pressure and on cleaning this away, found the lateral sinus bare about one-third of an inch. Antrum contained a small amount of pus, which proved on culture to be streptococcus hemolyticus. There was nothing further unusual about the operation and it was finished in the regular way.

Temperature fell to 100° that night and then to normal in a few days. Paralysis improved somewhat so that he could close his eye completely, but now after four weeks corner of mouth still sags and nasolabial fold is quite obliterated.

The early appearance of the paresis can be accounted for only by a dehiscence in the bone covering the facial nerve somewhere in its course

through the petrous bone. Whether or not there has been a destruction of the nerve, a true neuritis by direct extension, or simply pressure from an edema of the sheath, is difficult to determine. While the paralysis has improved slightly, it is not sufficient to be positive that the nerve has not been injured irreparably. There is, of course, still hope the nerve will regenerate, particularly since the branch to the eye has shown improvement.

Dr. Blackwell, referring to Dr. Heller's case of facial paralysis, said that in connection with acute inflammatory conditions of the middle ear it is sometimes characteristic of certain epidemics of coryza that there will be facial palsy connected with catarrhal condition of the middle ear, etc., and in order to determine whether or not it is a case of middle ear palsy it is customary to test the side of the tongue for its taste sensation, and if that side is involved it is generally assumed that the palsy has taken place in the middle ear and the mastoid is not affected. Of course, in this instance, since Dr. Heller reported that the mastoid was affected, the disease was probably connected with the disease in the bone.

Dr. A. N. Schiller: A case from Dr. Dougherty's service at City Hospital, child age 10 years, with a mental picture suspicious of meningeal infection. The temperature was more than one could explain by an acute mastoid. On operating, a negative mastoid was found, and seeking further the sinus was exposed and found to be normal in color, but with no pulsation at all. Here was a case with a negative mastoid and a macroscopically normal sinus, with thrombosis in the bulb.

Another patient was admitted to the Beth Israel Hospital in Dr. Kopetsky's service, with the same mental picture. The history was that of a young man of 19 years, with an otorrhea of ten days duration, but with a high temperature, which could not be explained by the otological findings. Operation for acute mastoid revealed a hard sclerosed mastoid with no pus present. The anterior wall of the sinus was exposed, showing a normal sinus plate. The patient was put back to bed and ran an atypical sinus temperature; the blood culture was negative, but the temperature caused suspicion. Later the case was reoperated upon and a sinus thrombosis was found extending way back to the torcula. Dr Kopetsky's case still has some choked disc.

Dr. Cyril Barnert said that eye findings in mastoiditis and its complications are uncommon statistically and comparatively, but when found are of extreme importance and are often the contributing factor which makes operative interference necessary. It is essential that every case of mastoiditis or impending mastoiditis should have a careful examination of the fundi oculi. This is important for two reasons: first, to discover the presence of any abnormality indicating an active process; and, second, for the careful charting of any aberrations from the normal physiological findings. The normal disc may be slightly blurred, there may or may not be a cupping of the disc, there may be opacities which make it difficult to get a good picture. If these are noted on the chart, anyone making a second examination of the fundus, and armed with the previous status, could make a better diagnosis of the conditions found. The points one looks for in the fundus are evidences of beginning optic neuritis or beginning papillary stasis or edema, and these are indicated by increased hyperemia of the surface of the disc, blurring of outline due to edema or exudate, and tendency for the physiological cup to fill up with exudate, increased tortuosity of the veins, together with a little elevation of the disc surface, possibly hemorrhages, and in case of papillary edema increased elevation, together with a marked contraction of the arteries as compared with the calibres of the veins. The cases that had been shown were typical, and showed a higher average of eye findings than one might expect, owing to the fact that at the Mount Sinai Hospital fundus examinations are made as a routine. In one instance there was a little slipup and the diagnosis was in doubt, and it was only after the temperature having

been low for several days showed a sudden rise accompanied with a chill, suggesting to the staff that she might be developing a cavernous sinus thrombosis, that an eye examination was requested. He made a special evening visit to the hospital, discovered an advanced bilateral papilledema, 3 diopters in the right and 6 diopters in the left eye, and a note was placed on the chart suggesting that it was undoubtedly due to primary bulb thrombosis or brain abscess. The otologists were called and tied off the jugular that same evening. That was the case of the girl admitted with streptococcus hemolyticus in the blood and multiple abscesses in the joints.

The case of the boy who had a bilateral optic neuritis presented some rather unusual features so far as operative procedures and convalescence were concerned. There was no definite evidence of any intracranial complications. Dr. Friesner believes that changes in the background invariably indicate an intracranial complication, and that the papilledema in these circumstances almost always predicates a sinus or bulb thrombosis, and Dr. Barnert's experience confirms this finding. There was a definite story of torpor and irritability, and in spite of the fact that nothing was found at operation, or nothing to indicate a further operation beyond the mastoid. Dr. Barnert said he believed that this was also a case of intracranial complication. There are cases on record of optic neuritis from focal infections, and perhaps that was the case in this patient, but it has been made a working rule that in the presence of an acute suppurative mastoiditis with optic neuritis, or papilledema we are pretty sure to be dealing with intracranial com-complications.

Another case was sent in two years ago by Dr. Willy Rieser with a diagnosis of lateral sinus thrombosis and double choked disc of 4 diopters; operation and recovery.

Dr. Barnert said he was not quite sure as to the way in which a papilledema occurs in lateral sinus thrombosis. It is certainly not the same type of papilledema as one due to increased intracranial pressure *per se*, but rather the type one sees in nasal accessory sinus disease and in focal infections of other types.

Dr. H. M. Scheer said it was interesting to note that in the entire series of cases presented by Dr. Maybaum and Dr. Rosen there was not one in which the clot was found deeper than the jugular bulb; in most of them the clot was above that, and in two it was in the jugular bulb itself, particularly when a number of these cases had been of such long standing, several weeks or a month or more. At the Manhattan Eye and Ear Hospital, within the past year, a young Italian girl came into the clinic who had been sick for a month with earache, for which she had been treated by someone outside. Not being relieved, she came to the clinic. She seemed very sick and toxic, and a diagnosis of acute mastoiditis was made. No further laboratory examinations could be made at the time, and she was immediately taken up to the operating room for a mastoidectomy, which revealed complete destruction of the process, with pathological sinus and perisinus abscess. An obliterating clot extending to 2 inches behind the knee of the sinus was removed before free bleeding could be obtained. This was done after the neck incision was made to tie the jugular vein. This was done after the neck the vein was found to be almost as stiff as a pencil and it could be easily lifted out of its sheath, extending down into the chest, so that the incision had to be extended down to the clavicle. This stiff jugular vein was ligated and resected at the clavicle; there was a severe phlebitis and clot throughout, down to where it was resected, and unquestionably further into the chest. The patient developed a right-sided lung involvement, but rallied along with transfusions and treatment by the internists for four weeks before she finally died. It was very interesting to see how she had gone along outside for four weeks, without anyone suspecting that she had anything more than an acute ear and before deciding that she needed hospital care.

Dr. Heller thought that this series of cases brought out one or two very interesting points. Of the seven cases, only three showed a positive blood culture before operation, and one a week afterward. We have been inclined to rely too much on the presence of a positive blood culture. Of course it is very advantageous to know that there is a positive blood culture, but sometimes we wait too long, and with out present methods of operating it is often safer when in doubt to go in and uncover the sinus than to wait until metastatic extension and other complications have occurred, such as those reported by Dr. Scheer. Dr. Kopetsky in a recent monograph on the "Systemic Infections Complicating Middle Ear Disease" has called attention to a very well put point. He differentiates between the two types of mastoiditis, the coalescent type and the hemorrhagic type, where the bone cells are intact, and where there is a great deal of bleeding and not much bone destruction; and he brings out the point that this hemorrhagic type of mastoiditis is a sort of thrombotic process in all the tiny vessels and capillaries throughout the mastoid bone, and that it is in these cases we are more apt to get the septic complications than in the coalescent type. In one of Dr. Maybaum's cases, the child had various metastatic processes with a normal middle ear, and yet at operation very little was found in the mastoid, though there was a sinus thrombosis; that is explained better by the statement of a localized sinus thrombosis of these tiny capillaries than in any other way; and perhaps when we operate it would be well to note what type of mastoid is found when the mastoid process is opened.

Dr. LeWald said he had hoped to hear more about the X-ray findings in these cases. What Dr. Heller had just brought out was absolutely to the point, *i. e.*, in the type of sinus involvement where there is some destruction of the roof of the sinus, it would seem that the X-ray examination would have revealed that fact. It would have been as great a comfort to the operator as a positive blood culture. The converse is just as true, that some of these cases may have shown no bone destruction, and consequently a negative X-ray finding. But one would not have withheld operative procedure on that account.

Dr. H. M. Scheer cited a case similar to Dr. Heller's, which was seen after having been watched for a short time by the family physician. A young man of 25 years had been suddenly seized with an acute pain in his right ear, and two hours later the physician made a diagnosis of acute otitis media purulenta. When seen by Dr. Scheer, the patient had a temperature of 102° and a bulging red drum. A paracentesis was performed, and pus under pressnre was discharged from the middle ear. Twenty-four hours later the family physician notced that the right side of the face was entirely paralyzed, and Dr. Scheer was again called in. He saw a good opening in the drum, and confirmed the diagnosis of right-sided facial paralysis. There was no tenderness over the mastoid, and no other physical findings were elicited. The patient was watched for three days, thinking that the paralysis might be due to middle ear involvement, no signs of mastoid involvement having been seen. The middle ear process began to subside, and the temperature became normal, and after the fourth or fifth day the man felt perfectly comfortable, had no tenderness, and showed no signs of mastoid involvement. An X-ray examination by Dr. Law showed the mastoid to be negative. Dr. Maybaum saw the case in consultation, and advised waiting, that the mastoid should not be opened, and that the middle ear inflammation might possibly be the cause of the paralysis. At the end of another four days, another picture was taken by Dr. Law, as a comparative plate, and, as Dr. Law expressed it, he could barely make any differential diagnosis between that and the first plate. After waiting another week, another plate was made, and still Dr. Law could not tell that there was any involvement of the bone, but there seemed to be the slightest suspicion of bone absorption at the tip. The discharge from the ear became a bit more profuse and thicker; the temperature

was negative, there was no tenderness, and the patient felt very comfortable. The right-sided paralysis was still complete. It was then decided to do a mastoidectomy, and at the operation a large tip cell was found with some pus in it. The rest of the mastoid appeared unchanged. There was no exposure of the facial canal visible, and nothing else was found. After a thorough exenteration, the wound was closed in the usual way, and the man made an uneventful recovery. The facial paralysis began to clear up on the third day after the operation, and at the end of the third week the entire facial condition cleared up and the man was discharged well.

Dr. S. Rosen said that it would seem that the importance of blood cultures cannot be overestimated. The impression gained from the blood culture work at the hospital is that it is of inestimable value. It is true that diagnoses of sinus thrombosis were made almost as often before the days of blood culture but undoubtedly, many were missed. The clinical picture should be the guiding influence; but one is apt to get into trouble if the help derived from blood cultures is neglected. A patient may present a clinical picture of sinus thrombosis and may have diffuse rales in the chest, so that it may be difficult to make a differential diagnosis between an otitic sepsis and pneumonia, excepting by blood culture, as in one of the cases presented tonight. Then the question of arthritis comes in. Certainly some cases of acute rheumatic fever present a typical clinical picture of sinus thrombosis with chills and fever, the temperature rises being 105° and 106° with joint involvement. It is important to determine whether the joints are metastatic, that is, involved by the ordinary cocci. In the true rheumatic cases, we have persistently negative blood cultures. The estimation of positive as well as negative blood cultures has certainly been a great aid in the interpretation of clinical symptoms and signs as well as pathogical findings.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

January 28, 1925

Paper: **"Nasal Tampon Treatment of Sinus Disease."** Dr. J. Ivimey Dowling.

DISCUSSION.

Dr. Llewellyn E. Hetrick took exception to the statement by Dr. Dowling that he inserted the tampons in the nose above the scroll of the middle turbinate; and said that his own custom had not been to do this, for there might be some anatomical difficulties in placing the tampon in exactly that situation. He has been in the habit of placing the tampon in the middle meatus beneath the middle turbinate and as close to the outer wall of the nose as possible. Owing to the great variation in the situation, size and shape of the middle turbinate, it is impossible sometimes to insert any but a very small tampon, and to get it in the middle meatus above the scroll of the middle turbinate seemed hardly possible. As to getting the tampon in approximation with the ostia, it is impossible, as long as the middle turbinate is in position, but we can get it very close in many cases.

Dr. Hetrick said he disagrees somewhat with Dr. Dowling in regard to the mechanism of the tampon treatment, for the doctor made it appear rather more complicated than it seemed to him. In his opinion the action of the tampon is due to a similar effect of a foreign body in the eye. There occurs during the placing of the tampon in the nose a profuse rhinorrhea, the excretions being greatly increased, and that increased flow if thin watery mucous which takes place during the time the tampon is in position is entirely due to the presence of the foreign body and it produces a definite irrigation. There is a secretion of a thin watery mucous from all parts of the mucous membrane and by means

of this increased secretion Nature flushes the sinuses from within out. Certain it is that following this treatment the patients all experience marked relief of the head congestion and, as Dr. Dowling said, their sensorium was clearer. There is hardly any class of disease that produces such a sense of depression as does sinus disease, and this mental depression is relieved almost magically by the tampons.

The question of the use of the X-ray in the diagnosis of sinus disease: Probably all would agree that it is only of value in those cases that are definitely positive. That an X-ray is negative does not mean that there is no sinus involvement.

The bleaching of the tampons in the presence of infection is quite characteristic and peculiar. Whether this is due to the colloidal silver, or whatever it may be, it will bleach over the area of the infected sinus.

Dr. Hetrick reiterated his belief in the value of argyrol. It is well known that hospital managers always try to use something that is just as good as argyrol and does not cost so much, but none of the other silver salts will do the work that argyrol does. He could not say too much in favor of this method of treatment, and closed by expressing the conviction that if Dr. Dowling, through his paper, had succeeded in so impressing its value upon the audience that a number of them would try it, he would have done a great service to all in presenting the subject.

Dr. Harold A. Foster said that about twenty-five years ago Dr. Dowling went to Albany where he began research work of sinusitis and complications. His principal discovery was that a colloid substance placed in the middle meatus and left there for a suitable length of time produced certain reactions. It seems as though the name of this procedure should be called "The Dowling Theory".

Before starting the discussion of Dr. Dowling's paper, I want to give what appears to be the answer to this theory. Due to their structure, formation and location, the ethmoid cells seem to be the vulnerable portion of the nares. They are prone to infection; they make a wonderful culture media and easily radiate their virus to the frontal, sphenoid and maxillary sinuses. The effect of argyrol placed and left in the middle meatus has not a direct effect on the various sinuses, but produces sterility to the ethmoid cells and inhibits the spread of infection. This allows the other sinuses, freed from the base of supply of infection, to tend to recover or to be more amenable to treatment.

A frontal sinus with its natural downward drainage is not given to infection unless there is cause at its outlet. Neither is a maxillary sinus without reason, either dental or nasal, prone to disease. In other words, render sterile the ethmoid cells so that the other sinuses may be clean.

There are so many instances where argyrol is indicated that it would be impossible to itemize them. One of the most obvious results from the use of the Dowling tamponade is in the treatment of polypi springing from a chronic ethmoiditis. The mucus membrane of the middle meatus and turbinates, due to the pressure from the polypi and continued bathing in pus, becomes hypertrophied, lifeless and degenerated. The nasal space is thereby lessened, increasing the difficulty of surgical removal and the turgescent engorged condition of the membrane causes, not infrequently, excessive hemorrhage upon surgical work. With a careful use of nasal argyrol tamponades the tissues' resistance can be greatly improved before surgical intervention. The membranes of the middle meatus and turbinates become shrunken, firm, and approach a normal appearance. The infected area of the ethmoids is cleared of pus and debris with the desired result that the operative field is rendered more sterile and the intranasal space considerably enlarged and the polypi now can be more easily removed with less chance of hemorrhage. Following the removal a course of argyrol tamponades are used to improve the infected tengescent tissues. The results, following the above method are gratifying and successful, and the remaining polypoid tissue tends to shrink up and the ethmoid cells return to a normal state.

Argyrol tamponades can be recommended and used with satisfactory results in postoperative nasal work. Following submucus resection with swollen turbinates and mucous membranes and excessive discharge of mucus we have a source of annoyance to patients and operator alike. This condition will be speedily overcome and improved with a few successive argyrol bakes. The argyrol tends to dry up the secretions, limit infections, harden the mucus membrane and bring the postoperative submucus speedily to the desired result. Likewise in postoperative turbinectomy and sinus work the argyrol seems to act specifically in reducing the congestion and rendering the field sterile and bringing the phase to a speedy and satisfactory conclusion.

In chronic catarrhal otitis media I have found that argyrol treatments will help materially in aiding and rendering less difficult inflations. The mucus membrane around the Eustachian orifice is reduced and infection is removed, thereby making inflation more successful with less chance of conveying trouble to the middle ear.

Argyrol is very important in the treatment of many acute and chronic nasal complications, but I am free to say that I have had very poor results in attempting to cure asthma by the argyrol tamponades.

In concluding may I assume that the Dowling theory is correct? It relieves and cures many congestions, and infections. By its actions it may render unnecessary surgical procedure on the sinuses, but I cannot attribute a great deal to its curative effects on asthma.

Dr. Harmon Smith said that upon a former occasion at one of the meetings of the section having as its subject the care and treatment of accessory sinus disease, Dr. Jonathan Wright had made the statement that when all nose specialists had exhausted every means by which the accessory sinuses could be evacuated surgically, they would ultimately conclude that the same results could be arrived at by intelligent and assiduous treatment. It would appear from the presentation of facts by the author of the paper that Dr. Wright's prophecy was approaching fulfillment. Dr. Smith lamented the absence of those who had persistently refused to accept any treatment for sinusitis as effective other than operative, but observed that they were probably in the class mentioned by the author as "sot in their ways". It might be concluded by those hearing the paper that a few only had followed this method of treatment, but owing to a coincidence he personally had profited by this method in having had a patient who had been cured by the author of the paper having passed through the surgical hands of three of the most ardent advocates of surgical procedure, before an endeavor on his and the author's part culminated in the cure of the case. Dr. Smith admitted that his means of treatment in this particular case were of little avail until the patient had fallen into the hands of the author, and only by following up this method was the patient finally restored to health. From this experience he had continued it in other instances, only varying it by first shrinking the tissues, sucking out the sinuses by means of his sinus suction syringe, which also leaves the medication in the sinuses, and, lastly, placing the tampon *in situ* and leaving it there until the patient reached his business or returned home or for one-half to one hour. Dr. Smith also said that instead of argyrol, which was not aesthetic and very disagreeable to use, he had employed other colloids of silver, as collene, etc.

If operation were a *sine qua non* and the result could be guaranteed beyond peradventure, the quickest way would be to go head and operate, but it did not always succeed. Hardly a week passed that he did not see cases that had been operated upon—and successfully as far as the operation was concerned—where the sinusitis had recurred, and it took as long to cure them afterwards as if they had not been operated upon. The trouble was that most specialists were too busy to give the patient the time required. The medication was not left in place long enough to obtain the full benefit thereof. It was impossible, in a large practice, to have a number of patients waiting around with tampons in place for

from ten minutes to an hour to reduce this turgescence. It took always longer than ten minutes to accomplish what was intended by the depleting effect of colloids of silver.

Dr. Smith said his method had been to put the tampon in and leave it so that the patients could extract it, and allow them to go home and remove it after about an hour. Treating a case every other day, or twice a week, or once a week, was of no avail. To treat a sinus case successfully, it should be treated once a day, in the majority of instances —in the beginning at least—and then one would begin to get results. Not until one took the time to treat these patients properly, and try to do something other than operate, would we change the opinions of those who think that nothing is worth while but operation.

Dr. Freudenthal said that it was a rather peculiar coincidence that he had used a very similar treatment ever since he can remember. Probably all present knew of old Dr. Gottstein's treatment for ozena and similar affections. This he had applied to atrophic conditions in the nose. He regretted that he had not read any of Dr. Dowling's publications, but neither had the doctor read any of his. About six or seven years ago he had read a paper before the Eastern Section of the Trilogical Society on a new form of treatment on the nose and throat, and at that time mentioned these applications. He had made certain experiments along these lines. When a tampon is put in the nose, if there is any degree of normal physiological action there the medicine is absorbed in a short time after the tampon is inserted; whereas in atrophic conditions half an hour or more is required for the medicine to be absorbed. Even then absorption does not always take place.

He agreed with Dr. Dowling in regard to avoiding the use of cocain in these cases. Usually he employs other measures in addition; in a case of empyema of the antrum, for example, he first washes out the antrum, for this reason: after syringing the edematous condition of the inferior turbinal is sometimes lessened very much, temporarily, and the tampon can be put in as far as desired. These tampons are left in for quite a while, and there is often quite a quantity of pus, scabs, etc., removed afterward. In his opinion, this is a sign of the capillary attraction to which Dr. Dowling had alluded, but in many cases it is not more than what Dr. Hetrick alluded to as the presence of a foreign body, or the production of Bier's hyperemia. The coating over the mucous membrane is gone, the celia begin to act and Nature begins to assert herself. He does not always use 10 per cent argyrol, but often uses boric acid, ichthyol, and argyrol in varying strength, 2, 5, 10 and even 15 per cent in some cases. He never closes both sides of the nose, for in many cases that would produce too much reaction. He had not given up the old methods entirely, for certain cases have to be operated upon, but we have to try other methods, and often get better results than by operating.

Dr. Freudenthal said he has had a somewhat large experience with asthma, and had seen some remarkable cures. He recalled the case of an old lady with catarrhal trouble whom he had treated with iodin, glycerin, etc., and who in his absence went to his assistant and told him that she wanted him to use the red medicine. He replied that he did not know what the red medicine was. "What," she retorted, "you have not got it; what sort of a specialist are you?" It is the same with asthma. One may sometimes get wonderful cures with very simple remedies, salt, soda, etc. These cases are remarkable, but they are purely psychic and the patients will come again for treatment.

He agreed with Dr. Dowling, that the internist and the rhinologist should work together in the treatment of these cases.

Dr. Delavan said that when he first began the study of the nasal sinuses they were known mainly as anatomical entities. Since that time, much has been learned of their pathology and many methods of treatment have been described. Many of the advances have been made through the efforts of American contributors. The surgical treatment of the sinuses, formerly in the hands of a few operators of exceptional skill, is now extensively practiced.

He heartily endorsed the views expressed by Dr. Harmon Smith and with him welcomed a principle of treatment which promised some relief from the excessive resort to radical measures which of late years had been so readily and sometimes so ruthlessly employed. In some cases radical measures are undoubtedly desirable, but it must be admitted they have been employed with great frequency, sometimes unnecessarily and with unsatisfactory results; while in the case of the radical frontal operation the resulting disfigurement has blemish. Such operations should be undertaken with hesitation unless clearly indicated. Any method which promises to relieve the necessity of radical surgical measures deserves most earnest attention.

Dr. Delavan said he had been greatly interested in the ideas advanced in the paper of the evening. The subject was too broad to be discussed casually, nor had he the practical experience with it necessary to do it justice, but he welcomed it and hoped that it would be carefully studied and tested, and that the results would show a great advance in the treatment of these cases.

Dr. R. C. Eckardt said that his acquaintance with Dr. Dowling began about fifteen years ago, and that he felt he could speak on this subject from a somewhat different point of view, for he had himself been a patient of Dr. Dowling's. Since then he had practiced this method on his patients. Sometimes, in the cases where there is not room to use a large tampon, the small tampons are very effective. One does not always have to place it high above the middle turbinate; in most cases he places it beneath. He has found that the number of cases requiring operation is materially reduced by using this method of treatment, as advocated by Dr. Dowling. Cases that looked as though they would have to be operated upon have cleared up completely after a few treatments. The use of these tampons is the most valuable single addition to our armamentarium that he knows of.

Dr. Heller said he would like to have Dr. Dowling state definitely whether he meant the superior or the middle meatus, for if the tampon was put in the superior meatus it was difficult to see how it could affect the maxillary sinuses, etc. Second: was he trying to exert pressure, or did he depend entirely on the medication of the argyrol. Third: if one is going to get any effect with argyrol, it must be fresh; it will not keep more than eight or ten days. Also, inasmuch as so much emphasis was placed on the value of this treatment in young children, how does he manage it? Dr. Heller said that he has found it very difficult to apply such a treatment to a young child the second or third time. He can get away with it the first time, but after that it usually takes several adults to control the child, and if Dr. Dowling could tell how to do it he would be very grateful. He also wished to know whether any home treatment was instituted.

Dr. Michaelis asked what Dr. Dowling meant when he said that the tampon was itself a diagnostic aid in the determination of sinus disease more certain even than the X-ray. While he himself held no brief for the infallibility of the X-ray in the diagnosis of sinus disease he could not see how a mere tampon in the nose could effect such an infallible diagnosis.

Dr. Dowling, in closing the discussion, said he would try to answer the various questions, but could not do so exhaustively for it would occupy as much time as the reading of the paper.

As to glycerin and ichthyol, that was one of the first things that he had used in the attempt to determine what virtue there was in any kind of medicine applied to the nasal tissues by means of the tampon. That went back twenty-five years, but other men may have had quite similar findings without having read papers by others. It was very gratifying to find that Dr. Freudenthal's work corroborated his own. The first preparation used was one of ichthyol, glycerin, and other ingredients called "ichtholdin". He had had some experience with it in gynecological work, and noticed that it occasioned very considerable depletion of the tissues and therefore believed it would prove beneficial in treating the sinuses, which proved true.

Dr. Dowling said he agreed with Dr. Smith that in the average case one should give daily treatments if possible. As for the home treatment, sometimes he prescribes a salin solution for irrigation, or a mentholated ointment, etc., but not when they can be seen frequently. Some of these patients live in the Adirondacks, and daily visits are impracticable.

As for the diagnostic value of radiograms, Dr. Dowling said he did not take issue with anyone concerning their value but often radiograms simply indicate the size of the cavities and the report is negative, very correctly; but it is in just that type of case that the tampon placed in the middle meatus gives relief. If in reading the paper he had said "superior" meatus, it was an error in speaking.

In referring to eye diseases of uncertain origin the doctor stated that argyrol tampons could be used for diagnostic purpose to determine any possible complication involving the sinuses. If, upon withdrawing the tampons they were found to be decolorized, he considered that sufficient evidence of later infection of the sinuses and despite negative report of radiograms he considered that such eye diseases should receive the benefit of complimentary nasal tampon treatment. In the presence of serious progressive disease of the uveal track or of the optic nerve he believed that the diagnostic value of argyrol tampons was such as to warrant operation upon the ethmoid cells and sphenoid sinuses, even in the face of negative radiograms.

Dr. Dowling further stated that he believes the time will come when the lack of operative procedure upon the posterior ethmoid cells and sphenoid sinuses will be considered an error of judgment on the part of the oculist treating these cases, and that many of the younger men would live to see the day when oculists will always refer such cases to the rhinologist for opinion and possible operation, during the early stage of so-called progressive optic nerve atrophy.

Replying to the suggestion of one of the speakers that the tampon acts as a foreign body in the eye, Dr. Dowling said that the ocular effects associated with nasal tampons are induced by stimulation of the collateral circulation.

The doctor stated that the application of drugs in colloidal solution to mucous membranes possessed many virtues over other methods. His ideas concerning the use of colloidal preparations had been influenced through discussions with such eminent authorities as Willis G. Whitney, of the General Electric Co., and Hille, who had invented argyrol. He believed that although the teachings of Martin H. Fischer, Loeb, and others relative to colloidal pathology was now little considered, that the time would come when they would be considered leaders in thought who were in advance of the times.

Concerning the strength of solution, the doctor determined that a 10 per cent solution was best adapted to this treatment for the reason that it is a near approximation in specific gravity to that of the mucous discharges as ascertained by tests made by competent chemists.

As for what had been said about asthma, Dr. Dowling said he hoped that would rest in the minds of those who heard him and excite some thought. He made no claim to cure asthma. If patients voluntarily stated that they had experienced cessation of attacks over a lengthy period the doctor accepted this as the patient's belief that they were cured and in the absence of organic lesions in vital organs he classed these cases as "cured". He was surprised himself to note the number of patients who had reported satisfactory relief from asthma after a course of nasal tampon treatment.

The great point is how to treat the ethmoid pathology and tamponage is one way of doing it. It is not claimed that this is the only method, but that this is one with which all rhinologists should be familiar in addition to other measures, such as suction and irrigation which are so generally used.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

Meeting of Feb. 13, 1925.

Dr. J. S. Macnie, *President.*

Congenital Narrowing of the Esophagus. Dr. Kenneth A. Phelps.

Baby R., age 7 weeks, was referred to me by Dr. E. D. Anderson, because of choking and cyanosis, which occurred at each feeding. There seemed to be an unusual amount of mucus in the baby's throat, which at times, necessitated removal by means of a catheter and suction.

The previous history is as follows: At two weeks of age the baby vomited its food. The vomiting was projectile in character, and occurred after one or two feedings a day. This became worse and at three-and-one-half weeks, the baby vomited nearly everything. She lost weight rapidly. She was then taken to the hospital and fed breast milk, per tube. Tubing was difficult and seemed to make her vomiting worse than ever. Atropin in large doses produced no improvement. X-ray showed 90 per cent of the gastric contents passed through the pylorus at the end of four hours. The diet was then changed to thick cereal, and she could keep this down; though it took nearly an hour for her to take 2 ounces. Water made her vomit at once. Hypodermoclysis was given daily, to keep up the fluid intake.

At seven weeks, she began to have choking attacks and cyanosis, which was much worse during feedings. X-rays were again taken, which showed definite stenosis of the lower fourth of the esophagus, with considerable dilatation above.

The esophagus was dilated by the Plummer method and the baby immediately improved. She was able to take liquids, so hypodermoclysis was discontinued. She gained weight at once and progressed to a complete recovery in three weeks.

She can now swallow as well as her twin sister. X-ray shows no obstruction in the esophagus.

Congenital anomalies of the esophagus are rare and the type this case illustrated is particularly uncommon. Such anomalies are classified as follows:

A. Absence of entire esophagus.
B. Esophagus represented by a solid cord throughout.
C. Doubling of the esophagus.
  (1) Complete.
  (2) Partial bifurcations joining near the lower end.
D. Congenital dilatation.
E. Congenital diverticula.
F. Atresia.
  (1) Upper cul de sac.
    (a) connected to stomach by solid cord.
    (b) no connection to stomach.
  (2) Two parts to the esophagus.
    (a) Upper blind sac.
      (1) Lower opening above into trachea or bronchus and below into stomach.
      (2) The blind sacs connected by solid cord.
      (3) The blind sacs not connected.
G. Tracheo-esophageal fistula with trachea and esophagus otherwise normal.
H. Stenosis—upper or lower part—never in middle.
  (1) Caused by a fold in mucous membrane.
  (2) Caused by diaphragm.
  (3) Narrowing of lumen—involving entire wall.

Congenital Occlusion of the Choanae. Dr. Kenneth A. Phelps.

Dorothy A., age 4 months, referred by Dr. Martin Nordland. The baby was born two-an-one-half weeks prematurely, the labor being long, forceps were used. She was a blue baby and breathing was started with some difficulty, the usual methods being unsuccessful; however, when her mouth was held open forcibly, she began to breathe. A nurse was kept in constant attendance to hold open her mouth, for it was found that as soon as it closed cyanosis appeared and breathing ceased. Respirations, with the mouth open, were very noisy, the tongue seemed to cleave to the roof of the mouth continuously.

Nursing from the first was impossible, as the baby could not breathe and nurse at the same time, so the child has been fed through a stomach tube since birth.

After the eighth day, she seemed to have learned how to hold her own mouth open to breathe. She had many attacks of cyanosis but would finally open her mouth to breathe if left alone.

There was an abundant yellow discharge from both nostrils, which poured out when the baby was tipped face down.

The voice has been clear since birth. The chest, on physical examination and X-ray, is negative, no thymus gland enlargement showed in the film. A very small mass of adenoids could be felt in the nasopharynx. The posterior nares were both completely occluded by a bony-like obstruction. A probe could not be passed through either nostril.

With the soft palate retracted, a Holmes nasopharyngoscope was used and the choanal occlusion could be seen. On the right side it seemed to be dimpled and on the left solid. Trying to blow air through the nostrils with a Politzer bag made tears bubble at the lower punctum of the lids. No palate, septal, jaw, or facial deformity could be discovered.

Operation: The left posterior nares was opened by means of a chisel, for it seemed to be solid bone. The right side was easier to open. Both were rasped well with a frontal sinus rasp and the new opening curetted. The posterior end of the septum was removed in one piece with its attached membrane on each side, by means of a forcep through the mouth. No tubes or packs were left in the nose.

There was little reaction from the operation and no improvement in the breathing for two days. I then placed a silver Eustachian catheter through each nostril, well into the nasopharynx and held the mouth closed, and for the first time the baby breathed through her nose. From this time on she was able to take the bottle and the stomach tube feedings were discontinued. During the next two weeks her breathing improved and she slept with her mouth closed. She left the city for a month, during which time both sides closed with granulations. Upon her return these were rasped away and she again breathed through her nose.

The yellow discharge has largely disappeared. Probably the opening is not yet permanent and more treatment may be needed to maintain good function.

A Series of Cases of Simple Mastoidectomy. Dr. J. A. Pratt.

The after-treatment of simple mastoidectomy depends on the type of infection, the method of operating, complications encountered and the reaction of the patient. In order to open this discussion, I will describe the method we have used for the past twenty years.

In preparing the female patient we do not cut the hair or shave the scalp, but plaster the hair down with non-flexible collodion, which keeps the hair in place until the wound is healed.

We do an electric burr operation for the following reasons: shortness of time of operation, thoroughness of opening the cells, no concussion shock, less danger of sinus and nerve injury, and with a small opening and smooth cavity, there is a quicker healing with less deformity. We try to keep the bone opening about 10 m.m. wide and running from the antrum to the tip. After the operation, unless the sinus is opened, a

spiral-cut rubber tube enclosing a gauze wick is placed in the cavity, starting in the antrum and coming out at the tip. The wound is now closed with Michel clips down to the rubber tube and after the gauze is placed in the external canal, the bandage is applied. If the case is a small child and the adenoids are large, they are removed at this time.

As soon as the temperature is normal the patient is allowed to go home, which as a rule is the following evening. The first dressing on the third day following the operation is usually made at the office. The clips are removed, the gauze removed from the drainage tube and not replaced, but the gauze is replaced in the external canal. The ear is covered with cotton and all is covered with the triangular-shaped black bandage. (Shown.)

The wound is now treated every day by drying out the drainage tube with swabs of cotton. On the fifth or sixth day the tube is removed and the cavity is irrigated with a potassium permanganate solution. After thoroughly drying the cavity with cotton swabs, the tube is returned to its former position. Each day thereafter the tube is removed and cleaned and all discharge removed with cotton swabs. Some time between the tenth and fourteenth day the tube is removed and the opening allowed to heal. If there is any discomfort, the opening is kept patulous by passing a small cotton wound applicator down to the antrum. This is rarely found necessary.

Our simple mastoidectomies are usually healed in twenty-one days. By using the spiral-cut tube only, there is generally a blood clot formed, which shortens the healing time.

Case 1: This patient, Mr. M., was the cause of the presentation of this paper. He was operated upon for acute mastoiditis in Michigan twenty years ago. He says the wound was packed for nine weeks and he was then discharged with a small hole back of the ear. The examination showed a scarred mastoid, very little depression, a small opening about 4 m.m. in diameter. This lead into a cavity filled with cholesteatoma, which, on removal, left a dermatized cavity about 2 c.m. in diameter. The left ear was also discharging and there was communication between into the mastoid cavity. This is a case of over-zealous packing.

Case 2: Dr. C., mastoid operated some years ago. After-treatment, mastoid packing. Operation successful, but left a depressing scar.

Case 3: Mr. N., operated two years ago. Patient had acute mastoiditis for six weeks. Left the hospital the day following the operation. Was well in two weeks. The after-treatment used was what we have described.

Case 4: Mrs. R., acute mastoiditis, left ear running four weeks before operation. Was operated Jan. 3. Patient was very septic, temperature second day, 104.° Patient left hospital on fifth day. Case healed in seventeen days. After-treatment the same as described.

Case 5: Miss R., acute mastoiditis, following scarlet fever. Ear started discharging while still sick with scarlet fever. Operated Jan. 23, after six weeks of middle ear suppuration. Left hospital the fifth day. At time of operation, the urine showed a plus 3 albumin; two days later, just traces. Case was well in seventeen days. After-treatment as described.

Hereditary Hemorrhagic Telangiectasis. Dr. Virgil Schwartz.

L. W., housewife, age 49 years, was admitted to the hospital Dec. 4, 1924, with severe epistaxis. She had been troubled in this way innumerable times since she was 14 years of age. Also she had had severe hemorrhages from tip of the tongue and from the tip of her right little finger on several occasions. She has been aware of a number of reddish spots on her face, tongue and hands for many years. She had a submucous resection five years ago, somewhere, and a perforated septum resulted. Two years ago there was a nasal hemorrhage so severe as to require hospitalization. A week prior to her recent admission she had had another such attack.

She has three children living and well. The father died of heart trouble; while an item of great importance is the fact that her mother died as the result of frequent, almost uncontrollable, nasal hemorrhages. Three brothers are well, and her sister died in infancy of diphtheria.

Except for evidence of a definite anemia secondary to her epistaxis, her laboratory studies show nothing abnormal. The coagulation time is five minutes, while the bleeding time is two-and-one-half minutes.

By firm tamponade the patient's epistaxis was held in check for a day or two at a time, but shortly after the removal of each pack the epistaxis recurred. The process, therefore, had to be repeated a number of times before it was possible to attempt cauterization. However, this was finally begun and has been continued with success, being directed principally at the margin of the perforation and the septal surface immediately adjacent to this.

The case was transferred to the Medical Service, and there attention was drawn to the fact that the patient has a number of dark or bright red spots of from 1 to 4 m.m. in diameter scattered over the body surfaces, both skin and mucous. Most of these are rounded and are present on the dorsum and tip of the tongue, the lips, the hard and soft palate, the nasal mucosa, the conjunctivae, the auricles, the cheeks, the hands and fingers, and one or two on the trunk. They greatly resemble petechiae, but differ markedly in that the latter are temporary, being only small bloody effusions, while the lesions here present are greatly engorged, swollen capillaries and venules—in other words, telangiectases.

It would be of great importance to know if the patient's mother, who died as the result of epistaxis, also showed these vascular anomalies. I believe that she did, though of course we have no proof beyond the history. If such were the case, it would add another family to a very small group, for up to 1923 there had not been more than thirty reported families, involving fifty-seven patients, who exhibited this hereditary hemorrhagic telangiectasis. Even if there were no such lesions in the preceding generation, it still remains a rare affection.

Ample precedent exists for the study of this condition in rhino-laryngology, for Chiari was one of the very first to recognize these lesions as telangiectases in a case of epistaxis, though he regarded them as caused by or associated with hemophilia. As a matter of fact they have no relation to hemophilia, purpura, acquired angiomas, or the hemorrhagic diathesis.

I wish only to mention very briefly the principal features of hereditary telangiectasis as recapitulated by Weber in 1908 and Steiner in 1917. The only constant etiologic factor is heredity; both sexes are involved about equally and may transmit the disease in the same degree. It is congenital, and is characterized by a developmental defect in the walls of the idlated capillaries. These latter lie immediately beneath the markedly thinned epidermis or epithelium. They are simply large blood-spaces lined only with a single layer of endothelium, and their walls seem to have no elastic nor muscle fibres. This structure predisposes to easy rupture, either traumatic or spontaneous, and so to hemorrhage of small or great degree. This occurs most frequently from the nose, usually long before the individual lesions appear, which may not be until middle life, and less often from the tongue and fingers, as in our case. Unfortunately the hemorrhages and the subsequent anemia seem to increase in frequency and severity with age, but by the thorough use of the cautery, preferably the chromic acid bead, and possibly radium, great improvement, if not complete cure, may be brought about.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

February 10, 1925.

The Nashville Academy of Ophthalmology and Oto-Laryngology met Jan. 19, 1925. The Chairman, Dr. Robert Sullivan, presided and the following cases were discussed.

Lynch Frontal Sinus Operation. Dr. M. M. Cullom.

Dr. Cullom showed the case of Miss C. W., age 55 years, who consulted him two years ago, complaining of deafness and a chronic purulent discharge from each ear, the ears having discharged since childhood.

Transillumination showed the left antrum dark; all other sinuses clear. A diagnosis of empyema of the left antrum was made and was confirmed by X-ray pictures.

A resection of the left nasoantral wall was done and a large amount of pus evacuated. The irrigations were kept up at intervals for about two months and the antrum cleared up, the purulent aural discharge subsided, and the hearing considerably improved. She was seen from time to time and the washings from the antrum continued clear.

Two months ago the patient returned complaining of headache. Transillumination showed nothing beyond cloudiness of the left antrum, the washings from which came away clear. The patient was seen at intervals for ten days, still complaining of headaches, which increased in severity and which were throbbing in character over the left eye.

Examination disclosed a tumor in the roof of the left orbit which was rather soft and had the feeling of a cyst. In a certain position a pulsation could be elicited. An X-ray picture was made which showed an involvement of the right frontal sinus, but a rather puzzling picture on the left. There appeared to be no cloudiness but an apparent loss of substance in the superior orbital ridge. Being anxious to know whether or not I was dealing with an aneurysm or an abscess, I aspirated with a hypodermic needle and drew off pus. Following the aspiration, infection took place in the orbital tissues and considerable swelling developed. Incision was made along the track of the needle puncture and pus was drained through the incision until the orbital cellulitis disappeared. Then the ethmoid cells on the left side were exenterated and an intranasal opening was made into the frontal sinus. Profuse drainage followed the intranasal opening. All the orbital swelling around the sinus disappeared and the sinus closed.

Jan. 5, 1925, the Lynch frontal sinus operation was performed. A Killian incision was made. A profuse discharge of pus followed the incision and it was found that practically the entire floor of the sinus had disappeared from the necrosis. The large sinus was filled with pus and granulation in spite of the fact that there was a free opening into the nose which had been kept open with a large frontal sinus probe every day. I think this illustrates well the futility of the hope that an intranasal operation can cure a well established chronic empyema of the frontal sinus. The cause of the pulsation in the orbital tumor was found to be that there was a large defect in the posterior wall of the sinus, exposing an area of the dura about as large as a silver quarter. The remains of the floor of the sinus were removed and the mucous membrane of the cavity curetted away. This region was packed with gauze soaked in iodin while the ethmoid region was being thoroughly cleaned out. A half inch drainage tube was inserted through the nose into the sinus and the external incision was closed without drainage. The deep structures were approximated with catgut and the skin was closed with skin clips. A large probe was passed through the drainage tube daily

and the tube was removed on the sixth day. Since that time a large frontal sinus probe has been passed into the sinus daily.

The points of interest in this case are: the fact that pus was never discovered in the nasal cavities, that no cloudiness was shown by transillumination, and that the X-ray picture was misleading.

DISCUSSION.

DR. HERSCHEL EZELL: To me the most impressive feature of this case is the fact that it occurred in an elderly person, as we expect to see this type of complication only in younger people.

DR. E. B. CAYCE: I think you can be very easily mislead by X-rays. I want to throw this out as a warning, as I learned it from a case in which the X-rays were absolutely negative, but when the frontal sinus was opened it was found to be full of pus. I think the success of a frontal operation depends upon two things; *i. e.*, the removal of the pathology and the establishment of permanent drainage and aeration.

DR. W. G. KENNON: Has there been any diplopia or any tearing of the sac?

DR. CULLOM (closing): I did not operate on the other frontal sinus. I had expected to find a communication between the two, but a very careful search failed to reveal any such communication. I did not feel justified in going through into the other side without more definite signs of trouble. In the four cases in which I have done the Lynch operation, there has not been the slightest muscle imbalance, nor any tearing. Three of the cases I have been able to follow very closely and the result is apparently perfect.

Stenosis of the Larynx. Dr. E. L. Roberts.

Dr. Roberts presented the following case: A. B., white, male, age 4½ years. Family history negative. The patient had simple croup several times. About the middle of November, 1924, he contracted diphtheria. Three days later his family physician was hastily summoned and found the child's condition such that an immediate tracheotomy was deemed necessary and was done without anesthesia. The patient apparently got along well and after twelve days the tube was removed. It was soon discovered, however, that he was not breathing well and in an hour or so the tube had to be replaced. During the following three weeks several unsuccessful efforts were made to get the child to breathe without the tube. The last attempt resulted in the child's condition becoming so serious that it was necessary to resort to artificial respiration for several minutes.

This patient was brought before the Nashville Academy of Ophthalmology and Oto-Laryngology at the December, 1924, meeting. At that time the possibility of a foreign body in the wind pipe was suggested. Attention was called to the fact that the larynx had been cut into and the tube placed in the larynx instead of below the larynx. The possibility of a psychic element was also mentioned and it was advised that the tube be gradually closed until the patient should become willing to make an effort to breathe normally. Intubation was also suggested, allowing the tracheal opening to heal by granulation.

Following this a bronchoscopy was done by Dr. Herschel Ezell but no foreign body was found, the condition being one of absolute closure of the larynx. On inspection of the stenosed area there seemed to be overlapping in the neighborhood of the cricoid cartilage, with considerable swelling and inflammation. Beyond this nothing could be seen. The vocal cords were visible above. Intubation was then attempted, without marked success, the family physician recently reporting that the child objected seriously to the presence of the tube. Efforts have been made from time to time to remove the tracheotomy tube, both with the intubation tube in, and without it. Either way, sooner or later the child begins to choke up and the tube has to be replaced in the trachea. The child talks better, however, than previously.

DISCUSSION.

DR. W. G. KENNON: In my opinion it would be a good plan to do a low tracheotomy and then try to splint the larynx in some way. It seems to me you ought to get rid of that continued source of irritation at the site of the original wound. If you do not get rid of that the chances of getting a good result will be practically *nil*.

DR. ROBERT SULLIVAN: I think the objection to wearing the tube can be overcome by making a small opening in the intubation tube, putting a string through that hole and as the tube goes down, pull the string out through the opening in the trachea and fasten the string with adhesive plaster. The tube will then stay in, as there is no way for it to get out. Then allow the lower opening in the trachea to close by granulation. Use a tube large enough to act as a splint and to hold this open until it grows back in the right position, then take the tube out.

DR. E. L. ROBERTS: I want to thank you for the suggestions that have been made. The idea of a lower tracheotomy appeals to me as being one of the best.

Atresia of the Pharynx Dr. W. B. Lee.

Dr. Lee presented V. B., a white female, age 15 years. This patient was referred to Dr. Lee by her family physician, who stated that she had come under his observation some three years ago with cough, ulceration of the pharynx, destruction of the soft palate, and apparent involvement of the right lung. A diagnosis of tuberculosis and lues was made and specific treatment instituted. About one year ago the patient developed an abscess of the middle ear, at which time she was referred to Dr. Lee, who treated the ear condition. Shortly after this the family physician left the city and on his return found that the ulcers in the pharynx had healed, but that the posterior nares were closed, rendering nasal breathing impossible.

DISCUSSION.

DR. M. M. CULLOM: I have seen a number of these cases and have seen all sorts of things done to try to get an opening, but I have never seen a successful one. They are very discouraging cases to attempt to do anything for, because of the scar tissue. This has been my experience. So far as relieving the condition, I think it is going to be a pretty difficult case to handle.

DR. E. L. ROBERTS: This is the first case of the kind I have seen, although it is not the first time I have seen this case. I saw her first about four or five years ago when making an examination of school children, and I saw her again about a year later. She seems to be a great deal worse now than she was when I first saw her. The soft palate seems to be pushed higher up and I do not believe there was complete closure the first time I saw her. My opinion then was that the trouble was of specific origin. While, as Dr. Cullom suggests, these conditions are difficult to handle and rarely successful, yet if there is any possibility at all of giving this patient even slight nasal breathing, I would make the effort.

DR. EUGENE ORR: I have seen three cases of almost complete tresia of the pharynx, all the result of adenoid operations. I cannot say as to the results as I did not have the opportunity of following them up. One of these cases had been operated on previously and the operating surgeon stated that the child had about twice as much breathing space as he had before the first operation. The operation which was done was simply an incision through the mucous membrane, and the posterior wall of the cut membrane was turned up and twisted so that it became anterior and was brought up against the posterior wall of the soft palate and wired with silver wire.

DR. ROBERT SULLIVAN: I operated on a case in which there was complete atresia following a tonsil and adenoid operation by a general surgeon. After dissecting out everything that I thought was scar tissue, I used an ordinary rubber catheter, pulling it out through the nose tight

enough to keep the soft palate from adhering to the posterior pharyngeal wall. The patient has some breathing space following this operation. Inasmuch as the this case was traumatic, I believe the chances for improvement were better than in Dr. Lee's case.

April 8, 1925.

The Nashville Academy of Ophthalmology and Oto-Laryngology met at St. Thomas Hospital, March 16, 1925, with the Chairman, Dr. Robert Sullivan, presiding. Dr. Herschel Ezell presented the following case:

Otitis Externa Hemorrhagic. Dr. Herschel Ezell.

L. L., a white female, age 12 years, first consulted me March 14, 1925. She gave a history of having had grip for several days previously and pain in the ears of twenty-four hours duration.

On examination the patient's hearing was impaired, she being able to hear loud voice only. In each external auditory canal, on the inferior wall, was found a large elongated tumefaction resembling a blood blister. The tumefaction in the left ear was oozing slightly, while the one in the right ear was dry, movable, and changed shape when the auricle was pulled upon. The provisional diagnosis was bilateral suppurative otitis media complicated with hematomata.

Under nitrous oxide gas the tumefactions were opened. A small amount of bloody serum was drained from each. On account of the hematomata, no view of the drums could be had.

A very interesting observation in the case is that the hematomata that was draining previous to operation has not discharged much, while the opposite ear is running a typical course of acute suppurative otitis media.

From the behavior of the case the condition is strongly suggestive of otitis externa hemorrhagica.

The right ear is discharging more than formerly, but the blood tumor is still present.

The existence of this condition as a separate entity is questioned by some otologists. Few writers, it seems, mention the condition. Bacon has reported several cases in which such effusions of blood have occurred independent of middle ear inflammation. (Archives of Otology, Vol. XIX, No. 1.)

DISCUSSION.

DR. W. G. KENNON: Some two or three years ago, Ballenger, I believe, wrote an article on these hemorrhagic types of otitis media that were quite common in certain camps during the influenza epidemic. He described very much the same condition that Dr. Ezell's patient shows. I have never seen one with quite so marked a bleb, it is interesting from that standpoint. In many of the cases Ballenger did a myringotomy at the beginning before the blebs had formed. In some of the cases these blebs formed subsequent to the myringotomy.

DR. EZELL (closing): I may add that the blebs, especially the one on the right side, filled the canal, which was quite red. As the auricle was moved the bleb could be seen. Now, of course, the blebs are very much reduced in size.

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SOME REMARKS ON LABYRINTHINE SURGERY.

DR. EDWARD B. DENCH, New York.

Perhaps no subject in otology is more under discussion and more unsettled than the one upon which I am about to speak to you.

When surgical invasion of the labyrinth was first brought to our notice all operators were most enthusiastic upon the subject and complete extirpation of the labyrinth was very freely practiced, not only abroad, but also in this country. With the passage of time, however, I believe that all otologists have assumed a more conservative attitude in attacking the labyrinth, and in my opinion this conservatism has been wise.

Cases of labyrinthine invasion by a pathological process may be divided into those in which the invasion of the labyrinth by a suppurative process occurs, as follows: First, cases where the invasion of the labyrinth is so insidious that it produces slight or no symptoms. Under this classification belong those cases in which erosion, slight in degree, occurs in one of the semicircular canals, usually the horizontal. These cases present a history of a chronic middle ear suppuration with, in certain instances, ill defined headache and vertigo. Quite frequently, the invasion of the labyrinth is so insidious and the progress is so slow that no symptoms occur and we find at the time of a radical operation an eroded area in one of the semicircular canals. As before stated, this erosion almost always occurs in the horizontal semicircular canal, so I shall not again repeat this statement and shall assume the horizontal canal is the one attacked unless I mention otherwise in the progress of the paper.

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The next class of cases is those in which the invasion of the labyrinth occurs rapidly and is accompanied by well defined headache and vertigo, that is acute suppurative labyrinthitis. In still another class of cases we have following operative procedure upon the middle ear, and the procedure is usually the radical operation, labyrinthine symptoms characterized by considerable vertigo, nausea, vomiting, nystagmus to both sides and an elevation of temperature of two or three degrees. These cases I regard as a serous labyrinthitis, secondary to the middle ear suppuration and probably caused by the operative procedure. One case of this kind I remember particularly. A girl about ten years of age suffering from a chronic middle ear suppuration. A radical operation was performed with the use of the primary skin graft. In this case the labyrinth was active at the time of operation. Within forty-eight hours after the operation the temperature rose to about 102,° the child was very dizzy, vomited, had nystagmus to both sides, and the spinal fluid was normal. The procedure consisted in immediately removing the primary skin graft and Dakinizing the entire cavity. The temperature fell in the course of forty-eight hours after this procedure, and the child made an uninterrupted recovery, although she remained absolutely deaf. This was a case of serous labyrinthitis following a radical operation.

The third class of cases with which we have to deal are those in which the invasion of the labyrinth is simply the first stage of an attack upon the intracranial structures represented either by an infection of the meninges leading to diffuse meningitis or to an involvement of the brain substance itself resulting in a cerebellar abscess.

The surgical procedures indicated in these various conditions are naturally varied, and in presenting this subject for your consideration I am simply going to present to you my personal experience. While the experience of no one man in this branch can be large, I hope that what I may have to say may not be entirely worthless.

Taking the first class of cases mentioned, that is, a fistula in the horizontal semicircular canal, discovered at the time of radical operation, which has presented no symptoms, or in cases where we have a dead labyrinth with no symptoms, it has been my practice to let the labyrinth severely alone. I ordinarily do the ordinary radical operation and in the absence of a labyrinthine fistula do not hesitate to graft the cavity primarily even although the caloric reaction may have been entirely absent prior to operation. If there is a fistula in the horizontal canal I never probe the fistula, although

I did do this formerly without any untoward results. My practice is to curette gently the margins of the fistula and remove all carious bone, making every effort not to accidentally enter the canal and thereby liberate labyrinthine fluid. I have followed this procedure in numerous cases and have never seen an unfavorable result. Naturally, I would not do a complete primary grafting in a case of labyrinthine fistula. The usual meatal flap is made and then one packing is placed in the middle ear, a second over the labyrinthine fistula and a third in the posterior part of the cavity. From long habit I have used iodoform gauze in these cases, but I presume a sterile gauze would do equally as well. The packing from the middle ear and the posterior part of the cavity is removed at the end of forty-eight hours, while an attempt is made to leave the packing over the fistula undisturbed. Sometimes this is possible, sometimes not. If the packing over the fistula comes away with the other packing it should be replaced. In other words, the diseased area of the semicircular canal should be packed off separately for at least a week after the operation. It is understood that in these cases the posterior wound is closed in the usual manner. The presence of a fistula to my mind is no contraindication to the complete closure of the posterior wound. At the end of two weeks the cavity is then completely lined with a secondary graft. This procedure has been employed in numerous cases, and in no case have I seen any untoward result. To recapitulate, a dead labyrinth producing no symptoms, or a fistula in the horizontal semi-circular canal producing no symptoms is no indication for a complete labyrinthine extirpation.

When we come to cases of acute invasion of the labyrinth, those characterized by symptoms of severe vertigo, vomiting and nystagmus to the opposite side, our procedure must be quite different. In all of these cases with one exception and, that was a fatal case, it has been my practice to operate early upon the labyrinth, and to do a complete labyrinthine operation. Four cases of this character have come under my observation. In two of these cases a modified Hinsberg operation was done, that is the vestibule was entered through the horizontal semicircular canal. The canal was laid open widely and the cochlea was next drained by removing the ledge of bone between the oval and round windows. The curette was cautiously used until the lower and a part of the middle turn of the cochlea were removed. The probe could then be easily passed through the opening in the vestibule under the facial ridge, emerging through the cochlear opening. Two cases were drained in this

way, both patients recovered and are living at the present time, although the operations were performed over sixteen years ago. In a third case of rapid involvement of the labyrinth,—this case occurred several weeks after a radical operation and after the patient had been discharged from the hospital, the Neumann operation was done. Pus was found in the labyrinth. A complete recovery followed in this case. It is interesting to note that in this particular instance the cerebellar dura was accidentally torn and there was a slight hernia of the cerebellar substance. The opening in the dura was closed by fine sutures and the area packed off separately. Naturally I thought that this accidental opening of the dura with the presence of pus in the labyrinth would probably be followed by a fatal issue. Fortunately, however, this patient made a complete recovery.

In one case, and this was in the earlier years of labyrinthine surgery, the patient gave a history of what apparently was an acute labyrinthine invasion two and a half years before. When I first saw him two and a half years afterwards, the left labyrinth was dead, and complete facial paralysis was present. This had come on at the time of the acute invasion. In this case I did a complete labyrinthine operation by the modified Hinsberg method already described. I found that the entire labyrinth had become ossified and there was not a trace of any of the semi-circular canals. The vestibule was entered with great difficulty and drainage through the cochlea was established in the manner just mentioned. This patient made a complete recovery and the facial paralysis was entirely relieved, the facial being exposed at the time of the operation. Here I am convinced that interference with the labyrinth was unnecessary, and that a radical operation with free exposure of the facial nerve would have been successful. In a fourth case which was one apparently of a chronic serous labyrinthitis a large amount of serous fluid escaped from fistulae in the horizontal and superior semicircular canals. The vestibule in this case was drained posteriorly and the cochlea left undisturbed. Here the ordinary radical operation was done. Naturally, no grafting was used in this case, and the patient made a complete recovery.

Quite different from this were two cases in which delay was fatal. One was that of a patient who, one month after a mastoid operation in which the infection had been pneumococcus Type 3, suddenly became dizzy and was readmitted to the hospital. He had no temperature, a dead labyrinth, nystagmus to the opposite side, his spinal puncture showed normal spinal fluid, and roughened bone could be felt in the aditus. The history of this case, however, had

been short and there had been no evidence of any erosion in the horizontal semicircular canal, at the time of the original operation. Here I felt that I might have to deal with a simple serous labyrinthitis, and knowing the gravity of the infection, I rather hesitated to do a radical labyrinthine operation in the absence of temperature, owing to the fact that the patient's symptoms were gradually disappearing, and because the spinal fluid was normal. The case was discussed, particularly with the laboratory men, and all felt that there was a certain amount of danger of liberating an infection which might become walled off subsequently, while immediate operation might be followed by an acute meningitis. The subsequent progress of the case proved that we were all absolutely wrong. The man suddenly developed symptoms of acute meningitis, and although a prompt labyrinthine extirpation was performed, the patient died shortly after the operation.

In doubtful cases where the labyrinth gives no reaction to the caloric test the operator should always perform the radical operation even in the presence of a comparatively acute history. In one case with spontaneous nystagmus, no vertigo and a dead labyrinth, with an indefinite history, all symptoms pointing to an acute condition and with a fundus so contracted that a negative caloric I thought might be disregarded, a simple mastoid operation was done. The horizontal semicircular canal was exposed as much as possible in this operation and no fistula was found. Twenty-four hours after there was a moderate rise in temperature with headache and a cloudy cerebrospinal fluid. Through a misunderstanding in my directions an immediate labyrinthine operation was not done, and this patient died of meningitis. This and the other fatal case impressed upon my mind the absolute necessity of determining absolutely the condition of the horizontal canal in every doubtful case when the caloric reaction is negative. This can only be done by a radical operation. While we may err in doing an operation unnecessarily extensive, the saving of a life in a doubtful case renders the procedure absolutely justifiable. In one instance in which a fistula was found in the horizontal semicircular canal in which the labyrinth was active, the fistula was enlarged and the vestibule entered through the horizontal semicircular canal. The cochlea was not opened as the labyrinth had been active and there was some hearing in the affected ear. In this instance the labyrinthine fistula was packed with iodoform gauze and the remainder of the cavity was grafted with a primary graft. This patient recovered, so that apparently the grafting about the fistula had no untoward effect

Occasionally during the process of a radical operation the stapes may be accidentally removed. This, naturally, opens an avenue of labyrinthine infection and considerable discussion has occurred as to the proper procedure to be followed in cases of this character. The accident has happened to me several times, perhaps a half a dozen, certainly not more than this in over six hundred radical operations. In one instance having a very clean field I disregarded the accidental opening of the oval window and inserted the primary graft. This patient died of meningitis. The procedure was an unwise one and has never been repeated. Since then it has been my practice to pack off the oval window with a strip of iodoform gauze, form the meatal flap, and close the posterior wound in the usual way. Two weeks later these cases have been grafted secondarily without any fatality. This seems to me the proper procedure in these cases.

In a number of cases we find more or less extensive necrosis of the labyrinth. This is met with in cases of long standing middle ear suppuration. In one case in particular which I remember, both ears were the seat of a very foul discharge. A sequestrum which on one side included the entire labyrinth, and on the other side almost the entire labyrinth was removed. On one side the patient had a facial paralysis prior to the operation. This patient made a complete recovery and the facial paralysis almost entirely disappeared. Unfortunately, I have been unable to find my records of a number of cases of necrosis of the labyrinth which I have seen. I remember this double one well, and I have seen one or two others in which partial sequestra have been removed. As I remember no fatality has ever attended a case of this kind at my hands.

We now come to a class of cases where the labyrinthine operation is employed as a primary measure for the surgical relief of meningitis. In other words, if the patient has symptoms of meningitis, and we have a suppurating ear and a dead labyrinth, we hope by a prompt operation to eliminate the primary focus of infection so early that the meningitis may remain localized. In these cases it has been my practice to do the Neumann operation with free exposure of the area triangularis as far as the internal auditory meatus, to incise the dura in this region, and to drain the subdural space by means of a rubber tissue drain. In a few instances an attempt has been made to wash out the subdural space through the opening in the dura through a needle inserted into the cisterna suboccipitally.

All cases in which the labyrinth has been operated upon in the hope of curing an otitic meningitis have been fatal with the exception of one. This case was operated upon by the late Dr. Charles E. Perkins. In addition to draining through the area triangularis a large subtemporal decompression was done. There was a large cerebral hernia. The entire wound was Dakinized for a number of days. Although this patient had all the symptoms of meningitis with rigidity, headache, temperature, etc., he finally recovered. Unfortunately, a subdural fistula appeared, in other words, cerebrospinal fluid discharged from the ear in small amounts continuously. The patient was urged to have a second operation for the closure of this fistula. He refused, however, and died six months later from meningitis, having been perfectly well for the previous six months and being able to attend to his duties.

Summing up, therefore, I have to record twenty cases of labyrinthine invasion in which the records are fairly complete. Seven were cured, and thirteen died. In all of the thirteen fatal cases, meningitis was present at the time of the labyrinthine operation, and the labyrinthine operation was simply undertaken to drain the subdural space through the area triangularis.

In think we may say as a result of this analysis of cases, that as the seven cures were cases of uncomplicated labyrinthitis that prompt operative interference at the occurrence of acute labyrinthine symptoms offers an excellent prospect of recovery, but that delay in the presence of labyrinthine symptoms is bad surgery.

A dead labyrinth without symptoms need not necessarily be removed. In fact, in the absence of symptoms it is inadvisable to interfere with the labyrinth. The presence of a labyrinthine fistula which gives rise to no symptoms and is only recognized at the time of a radical operation is no indication for a labyrinthine extirpation, but should be treated in the manner before described. Accidental opening of the oval wind is not necessarily followed by meningitis, and if the oval window is packed off at the time of operation meningitis will probably not follow. The removal of the labyrinth in cases of meningitis has, in my hands at least, proved extremely unsatisfactory, and while in the absence of any better procedure at present we shall probably all perform the operation, I cannot say from my own experience that it has been of material benefit.

GASTRO-INTESTINAL DISTURBANCES IN INFANTS AS A RESULT OF OBSCURE INFECTION IN THE MASTOID.* **

Dr. Arthur M. Alden and Dr. Harry W. Lyman, St. Louis.

The co-existence in the same baby of severe gastro-intestinal disturbance and otitis media has been noted for many years by both pediatricians and otologists.

The first, however, to suggest a causal relationship between the two was Hartmann[1] who, in 1898, mentions the fact that digestive disturbances, diarrhea and progressive loss of weight in infants, may be brought about by infection in the ears. He also found that drainage of these infected ears by paracentesis favorably affected the gastro-intestinal syndrome and suggests that all infants with intestinal disease and progressive loss of weight should have the ears carefully examined for possible otitis media. Preysing,[2] in 1904, stated that he believed that the severe intestinal disturbance in such cases was due to toxic substances which had found their way into the blood or lymph currents owing to rapid absorption from the middle ear empyema. In 1921, Maurice Renaud[3] made the following statement:

"During the months of August and September, 1921, the middle ear and mastoid antra were examined in seventy consecutive autopsies on infants that had died from athrepsia and infantile diarrhea. In all of them extensive suppuration in the middle ear and mastoid antra was found. Thirty cases had been diagnosed as otitis media during life. The forty others had been overlooked. The final diagnosis in most of the cases was infantile diarrhea.

"The clinical course of all of these infants was that of progressive athrepsia with vomiting, diarrhea, final cachexia and death.

"The pathological findings in these cases, was far as the digestive tract went, were generally negative except in certain cases for hyperplasia of the lymphoid tissue. Pus infection of the middle ear and mastoid antra was found in all the cases. In four-fifths of the cases the lesions were bilateral. The ear drums were usually thickened and red, though in many of the cases they appeared

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*From the Department of Otolaryngology, Washington University Medical School, St. Louis, Mo.

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normal. There was not only inflammation of the mucous membrane but a true osteomyelitis of the petrous portion of the temporal bone. The internal ear showed infection in a small number of the cases.

"As a result of these post-mortem examinations and in an attempt to save some of these babies, post-auricular drainage was done in ten cases of athrepsia in extremis. Nine died. One made a splendid recovery. The high percentage of mortality was attributed to the fact that the operation was done too late and when the baby was in desperate condition. After this treatment the ears of all these patients showed at least temporary improvement."

His conclusions were as follows: "Nurslings become cachetic because they are suffering from infection, not because of heredity or dyspepsia."

"Ears must always be examined, and antrotomy done if there is no improvement after a few days of conservative treatment. The diet question becomes secondary to the presence of infection."

That children often show marked constitutional disturbances, usually of gastro-intestinal type, which are the result of infection in the mastoid, without the usual symptoms of mastoiditis, is well known. McDougal and Knauer[4], in 1923, reported five cases of mastoiditis in children, in which the principal symptoms were extreme prostration, progressive emaciation and lethargy without any of the classic signs of mastoid infection being present. Of these children, three died and autopsies demonstrated extensive pathology in the middle ear and mastoid, which was due in each case to the streptococcus. The two children who lived were those in which early bilateral drainage of the mastoid was done.

Byfield[5] also calls attenton to gastro-intestinal symptoms in children which are the direct result of obscure infection in the middle ear or mastoid. Floyd[6] reports a series of twenty-six babies with mastoid infection which came under his observation. The most marked symptoms were severe and sudden gastro-intestinal disturbance, rapid dehydration with pronounced loss in weight, extreme toxicity and, in a few of them, death within a short time from the onset of the disease. His conclusion is as follows: "Bilateral mastoidectomy performed as soon as the condition is determined and other foci eliminated has resulted in prompt recovery of many of these infants and is probably the only means of saving the childs life.

Marriott[7] summarizes the pediatric aspect of this syndrome in the following statement:

"It is now pretty well recognized that the acute nutritional disturbances of infants associated with fever, diarrhea, hydrolability and toxic symptoms are not the result of a food or alimentary intoxication in the sense that some particular element of the food is at fault. With intestinal infections and food poisoning ruled out as factors, we are forced to conclude that there must be some general metabolic disturbance or a toxemia of infectious nature. The fact that these infants have fever and leucocytosis which at times is greater than can well be explained on the basis of anhydremia alone suggests the possibility of infection. Autopsies on these patients reveal no lesions in the gastro-intestinal tract and no infectious foci in locations usually examined. Two years ago we began making somewhat more complete autopsies on infants succumbing to nutritional disturbances. The mastoids were opened at autopsy and it was found that the mastoid antra were filled with purulent material containing hemolytic streptococci. This finding occurred in patients in whom the drum membrane had been widely opened some time previous to death, it being evident that this procedure had not been sufficient to insure drainage of the mastoid antrum.

"That the symptoms of these children, especially the hydrolability or gastro-intestinal symptoms, are the result of a specific intoxication rather than of fever in itself seems probable. Infants suffering from other types of infection with higher temperatures do not exhibit the same symptomatology. Even infants with mastoid infections due to other organisms such as the pneumococcus or staphylococcus do not exhibit these symptoms. It seems probable that the symptoms are the result of a streptococcus toxin and that this toxin acts by damaging the capillaries. The toxins of other streptococci, such as the scarlet fever streptococcus, act on the capillaries of the skin and of the renal glomeruli. In infants the gastro-intestinal tract is the seat of much greater activity than in older children and it seems that the toxin affects the capillaries more in this portion of the body than elsewhere at times, and occurs as an association to the capillary changes. The capillaries of the skin surface are definitely constricted in these infants and abnormal in shape. Laying aside the theory of the possible mechanism of these infections in bringing about the symptoms the fact remains that such infections are constantly associated with the condition under discussion and that the most hopeful method we have yet found consists in dealing promptly with the infections."

Our work on this group of cases was begun about two years ago at the suggestion of Dr. W. McKim Marriott, the Director of the

St. Louis Children's Hospital. What success we have had in the treatment of these babies has been due in a large measure to his helpful counsel and the splendid co-operation which we have received from the entire pediatric staff of the hospital.

At first we were somewhat reluctant to accept this new idea of infection in the mastoid of infants being responsible for alimentary symptoms, but autopsy protocols of several of the babies who died convinced us that in many cases we had overlooked this obscure type of infection. More frequent and more careful examinations of the ears of these babies with the electric otoscope demonstrated the fact that infection in the mastoid antrum of a baby is not entirely without otologic signs.

Examination of the ears of these infants rarely shows the conventional signs of acute suppuration in either the middle ear or mastoid and in none of these cases were any of the external signs of mastoiditis present. The ear drums may be dull and gray or may show slight reddening and may or may not be bulging. However, there is always some change in their color, the normal lustre having given place usually to a dirty gray, opaque appearance. The one finding that is most constantly present is a distinct sag of the superior or posterior superior wall of the auditory canal just external to the tympanic membrane. With the use of a head mirror and reflected light this sign may easily be overlooked, but if the ears are carefully examined with the electric otoscope and brilliant illumination this phenomenon can usually be found.

In infants there are two anatomical factors which help to make this particular symptom of more than ordinary significance. At birth, the antrum, attic and upper portion of the middle ear are filled with soft mesodermal tissue, which, as the child grows, becomes gradually absorbed and thinned out. But in early child life there is so much of this embryonic mucosa remaining in the attic and antrum that it requires only the slightest irritation in this region to cause swelling enough to entirely separate these cavities from the middle ear. This is the reason why suppuration in an infant's mastoid antrum cannot be adequately drained by the ordinary incision through the tympanic membrane.

The second anatomical consideration which has a definite bearing upon this condition is the fact that in infants the tympanic annulus in its superior portion is incomplete. Therefore any accumulation of fluid in the antrum will show as a bulge downward of the membranous floor of the antrum or upper wall of the external auditory

canal. An incision in order to drain these accumulations must include not only the upper portion of the tympanic membrane, but this membranous floor of the mastoid antrum as well.

With this fact in mind, repeated incisions in the upper part of the tympanic membrane and floor of the antrum were made in several of the cases, often followed by a temporary drop in the temperature and slight improvement in the general condition. However, in the majority of the babies the diarrhea, vomiting and general drying out continued until more adequate drainage was established by way of the mastoid.

The surgical drainage of infected mastoid antra in infants is not a formidable procedure. In all of our cases except one it has been carried out under local anesthesia. For this purpose ½ per cent novocain with 8 drops of adrenalin to the ounce is used. The skin along the line of incision and the periosteum over the upper portion of the mastoid is thoroughly infiltrated. The incision required is usually only about 2 c.m in length. After the periosteum, behind and above the superior bony wall of the external auditory canal, has been elevated, a round button of bone is taken out with two strokes of an 8 m.m. Alexander gouge. This usually completely uncovers the posterior end of the mastoid antrum. In infants, this consists usually of a single cell varying in size from 6 to 10 m.m. in diameter. Careful curettage of all granulations from this cell is done without any attempt being made to pass the curette into the attic. In other words, the mucous membrane of the aditus ad antrum is left undisturbed. A small drain is placed in the cell and no attempt at surgical closure of the incision made.

The post-operative care of these cases consists simply in changing the drain and wiping out the mastoid cavity with a solution of mercurochrome until the middle ear has become entirely dry. The drain is then withdrawn and the wound allowed to close, which it does very rapidly.

The diagnosis of this syndrome must rest for the most part upon pediatric considerations. The diarrhea, vomiting, progressive loss of weight and consequent anhydremia are all definitely outside the realm of the otologist. This picture should, however, suggest to the pediatrist the possibility of a streptococcus infection in the ears, and in the diagnosis and treatment of this phase of the condition alone is the otologist concerned.

The treatment of the case with the exception of the operation and simple surgical dressings should be carried out by the pediatrist. This consists for the most part in supportive therapy coupled with

replacement of the lost fluids until the hydrolability is corrected. Upon the success of these measures the outcome of the case depends, for unless the weight can be kept up until the infection has been eliminated and some resistance established, disaster is sure to follow.

Up to date, we have operated upon fifteen baies with athrepsia. These children were between two and fourteen months old, the majority between three and seven months. Of this group, eight recovered and seven died. The average of the ages of the children that recovered was eight and three-eighths months, that of the fatalities three and five-sevenths months. From this it would appear that the older the child the better the chance for recovery. None of the deaths could be attributed to the operation or to post-operative shock, despite the fact that several of the babies were "in extremis" when operated upon. Even those that finally succumbed showed distinct temporary improvement following operation.

Cultures taken at the time of operation showed hemolytic streptococcus in eleven of the cases, pneumococcus in one and three of the cultures were lost or contaminated so that a report was not available.

In nine of our cases both ears were involved, while six showed pathology on one side only.

In the light of our present knowledge of this condition we feel that several of the fatalities, especially in the early part of our work, could perhaps have been avoided had they been operated upon as soon as the diagnosis was established instead of temporizing with the use of more conservative measures. Inasmuch as heretofore the mortality rate in this condition has been practically 100 per cent, the fact that we have been able to save more than 50 per cent of our cases seems to demonstrate conclusively the value of this form of treatment.

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FURTHER OBSERVATIONS CONCERNING THE NATURE OF NUTRITIONAL DISTURBANCES. (Author's Abstract.)*

Dr. McKim Marriott, St. Louis.

Nutritional disturbances due to dietary faults are now fairly well understood and may be satisfactorily treated. Such disturbances are usually the result of diets deficient either quantitatively or qualitatively. The theory of food or alimentary "intoxication" fails in many particulars to provide a satisfactory explanation for the disturbances. That enteral and parenteral infection may result in nutritional disturbances has been recognized for many years. The purposes of this paper is to point out the apparent etiological relationship between infections of a special type and the severe nutritional disturbances characterized by severe watery diarrhea, prostration, rapid loss of weight, failure to retain fluid, even when given in large amounts, a gray color of the skin and acidosis.

Complete autopsies on a number of infants suffering from this type of disturbance revealed streptococcus infections of the mastod antrum. Similar observations have been made by Renaud,[1] Byfield,[2] and Floyd.[3] In a group of twenty infants suffering from the symptoms described mastoid antra were opened under local anesthesia and streptococcus pus obtained. The operation itself caused very little disturbance. In a large proportion of the cases there was almost immediate relief of the symptoms. The usual local signs of mastoid involvement, such as swelling, redness and tenderness, were absent. The tympanic membrane showed some change; in all cases there was consistently a sagging of the posterior superior wall of the canal near the junction with the tympanic membrane. It is possible that a mastoid antrum infection can clear up without operation, but in many young infants there is excessive folding of the embryonic mucosa in the attic, which in the presence of infection swells so as to completely close off the attic and antrum. In other instances the *aditus ad antrum* is so narrow at its posterior end that adequate drainage is not possible. In this way infections remain active in the mastoid antrum despite free paracentesis.

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Infections of the mastoid antrum with other organisms than the streptococcus do not give rise to the same general symptoms and it is suggested that the streptococcus toxin exerts a specific action on the capillaries of the body in general and of the intestinal tract in particular, which results in the hydrolability which is so characteristic.

The most successful dietary treatment has been a caloric diet of undiluted lactic acid milk with the addition of fair amounts of corn syrup. Any considerable restriction of the diet is to be avoided.

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A DISCUSSION OF SOME OF THE CLINICAL PROBLEMS OF CHRONIC SUPPURATIVE OTITIS MEDIA.

Dr. George E. Shambaugh, Chicago.

When I undertook to select a subject that would be suitable for my discussion this evening I asked myself what would interest me if I had an opportunity of listening to some of the men here present discuss otology and the thought occurred to me at once that I would be very much interested in hearing you discuss some of the every-day problems. It is always interesting to hear what crystallized conclusions one has reached regarding every-day problems after a decade or two of practice in otology. I confess in the beginning that I have nothing new to offer and that I appreciate that I do not know nearly as much about the subject of chronic otorrhea as do some of you.

One phase of this subject I should like to discuss briefly; that is the relationship that may exist between chronic otorrhea and disease of the nose and throat. That a relationship exists is, of course, well-known but that this relationship is often over-exaggerated I am fully satisfied. The most important relationship is that we get infection into the middle ear from nose and throat infection. Another is that tubo-tympanic conditions develop from growths in the nasopharynx of which, of course, adenoids are the most common, but any new growth is likely to have as one of its earliest symptoms evidences of tubal occlusion. Another relationship in which we have become interested in recent years is that between

latent infection in the nose and throat and such degenerative processes in the ear as chronic progressive nerve deafness. The relationship here is not one of contiguity and infections from any other part of the body might be expected just as readily to produce the degenerative processes in the auditory nerve as would diseases of the sinuses or tonsils. I suspect, however, that we are as much inclined to over-estimate as to under-estimate the importance of this relationship. Systemic infection from tonsils has been vastly over-estimated, although we are all satisfied that an important relationship between the two does exist.

My reason for discussing this phase of otology is because I am satisfied that there is a great deal of misunderstanding regarding relationships which may exist between such things as anatomical variations in the nose and defective hearing. The nose has always been a prolific field for enthusiastic fads for such, in my opinion, is the assumed relationship between anatomical variations in the nose and ear trouble. You will find in the literature fine spun discussions about the irregularities of the septum which by producing abnormal air currents in the nasopharynx produce middle ear trouble. The careful observation of cases will, I think, satisfy any fair-minded person that such relationship is entirely imaginary. Look, for example, at the condition of cases of congenital atresia of the choanae of one or both sides. If the alterations in the nose referred to above were capable of producing middle ear trouble then we would expect to find cases of atresia unusually prone to tubal conditions. I have seen four of these cases and in not a one was there the slightest evidence of any middle ear trouble. The condition in the nose that is most frequently subjected to operative interference for the relief of ear trouble is irregularities of the nasal septum. My own conviction is that no relationship whatever exists between such irregularities and the development of any form of ear trouble. Let us take up now some of the clinical problems of chronic suppurative otitis media. We are all in these days alert to the menace that exists in chronic suppurative otitis media. However, a running ear was not always regarded as a menace and the idea was formerly rather widespread that a chronic running ear had better be left alone, that if anything was done to stop the discharge it would only lead to the development of some more serious complication. This idea may have originated from the clinical observation quite familiar to all of you, that a profusely discharging ear may suddenly cease or the discharge become greatly diminished and it is not until 24 or 48 hours that symptoms develop of some

complication as, for example, the swelling in the neck or intracranial disease. The sequence is now well-known. The perforation of the mastoid abscess takes place, the pus brought in contact with these soft tissues is absorbed and it is not until some little time has elapsed that other evidences of the perforation, such as a swelling in the neck, meningitis, etc., has time to develop. As a matter of fact, an appreciation of the real menace from chronic suppurative otitis media became recognized only after the custom of holding post-mortems became general when it was discovered that many patients died of complications, such as meningitis, brain abscess, sinus thrombosis, in which the ear had not been suspected.

When examining recruits during the first period of the war I became impressed over and over again with the fact that a patient may have a chronic running ear that actually constitutes a serious menace and may still be quite unaware of the fact that the ear was discharging. The full recognition of the menace that exists in chronic suppurative otitis media gave to the otologists a very definite problem, that of clearing up the infectious focus. Many methods of local treatment were tried out; often ears that had discharged from thirty or forty years were cured after only a few proper local treatments. It was found, however, that while local treatments cleared up a certain number of these cases, there were others that would not clear up by local treatment of any sort. Efforts were naturally undertaken to eradicate the process surgically, some believing that the fault lay in impaired drainage advocated ossiculectomy and this operation for a time had quite a vogue until it became apparent that very few cases of ear disease cleared up after ossiculectomy, which would not also clear up under properly directed local treatment.

Working with the same idea in establishing better drainage, efforts were made to cure the chronic discharging middle ear disease by following out the typical Schwartz operation of draining the antrum. Schwartz himself for a time operated on many of these cases with the intention of leaving the antrum open as long as possible, placing a metal tube from the antrum through the aditus. This method also proved as disappointing as ossiculectomy, for the simple reason that these intractable cases of chronic focus of infection, a bone invading disease exists somewhere in the passage from the tympanum to the antrum, which focus could not be eradicated except by surgical measures. This conclusion naturally led to the development of the radical mastoid operation in which these upper chambers, the attic, aditus and antrum, are thoroughly exposed and the focus of infection eradicated.

For a long time quite a controversy went on between those who advocated the radical mastoid operation for all cases of chronic suppurative otitis media and those who limited its application to the exceptional case, and this conclusion was for a considerable period accepted, that where local measures properly carried out over a reasonable period of time fail to cure a suppurative otitis media, there the radical operative interference was indicated. How long this period of local treatment should be carried out, varied from a few weeks to a few months.

I would state that this view is not the one otologists hold today and one of the chief advances that modern otology has achieved is the more accurate selection of the cases where the radical mastoid operation is really indicated. The situation can be stated in simple terms as follows: There exist, broadly speaking, two types of chronic otitis media, one in which there are elements of danger and the other in which elements of danger are practically absent. In the first there is a bone invading process and in the other the disease is restricted to the mucous membranes lining the middle ear chambers.

The problem then is one, in the first place, of differentiating between the simple and the bone invading process. It is only the latter where a radical operative interference is called for and in not all of these cases. This clinical differentiation is one which an experienced otologist can make with very little difficulty, often after a single examination and certainly after a few weeks of observation.

I shall point out some of the more significant clinical differences first, as regards the discharge. The amount of discharge plays an unimportant part since the most dangerous forms of chronic otitis media are those where the patient is not aware that he has any discharge. A profuse discharge, of course, means a more active process but it is not a help in differentiating between the simple and the bone invading process. The character of the discharge is of considerable importance. A mucousy discharge or one that is more mucous than purulent is rarely found in bone invading disease except at periods when such a chronic disease becomes complicated by an acute exacerbation. In the bone invading process, granular sediment or cholesteatomatous material points to a more serious type. The clinical significance of the odor is of considerable importance. A bone invading disease is liable to be associated with a very offensive odor quite different from the odor that may be present in an ear where cleansing treatment has been neglected. In the latter case, the odor usually disappears after a few cleansing

treatments. In a true bone invading process, deep-seated caries or cholesteatoma, no amount of cleansing is capable of clearing up the bad smell.

The careful examination of the drum membrane gives us some very important clues in the diagnosis we are aiming to secure. The size of the perforation is of no special significance. What is of importance is the question as to whether the perforation has destroyed only the membrana tympani or whether it has also extended to and involved the bony margin. The latter always means a bone invading disease. Sometimes this is circumscribed to the bony margin itself and it should be kept in mind that in all cases where there is caries in the recessus epitympanicus or a cholesteatoma, a marginal perforation exists. The marginal perforation seems to be essential with very few exceptions for the development of a cholesteatoma, which it is well-known is the most dangerous type of chronic otitis media. A perforation in Shrapnell's membrane is very prone to lead to an invasion of the epidermis into the chamber of the attic and the formation of cholesteatoma.

Persistent, unilateral headache, when restricted to the side on which there is a chronic running ear, is rightfully looked upon as a possible indication of threatened intracranial complication, but where this headache is found in a patient where the running ear is of the simple type, it is highly improbable that the headache has anything to do with the ear trouble. I have several times seen cases of this sort where because of the chronic running ear the physician in charge, in spite of our advice that the type of ear trouble rarely if ever resulted in any condition capable of producing headache, insisted on carrying out an operation, and I have seen these cases months and months after the operation complaining of the same headache.

One of the practical problems that the otologist meets with is the question of what course to take in a patient who has a bilateral otitis media in which the radical mastoid operation is indicated. I have come to the conclusion that it is not a proper procedure to operate on both ears at once because no one has yet discovered a method by which he can be sure that the radical mastoid operation may not result in a rather serious increase in the impairment of hearing. Where the patient has a bilateral process in which the operation is indicated or where this operation is indicated in an ear that is the one on which he relies for hearing, one should consider the situation very carefully before subjecting such patients to operative interference. Only recently I saw just such a situa-

tion—a child 9 years old, who had had bilateral otitis media since the age of 3, had a radical mastoid operation on both ears, with the result that while he heard fairly well before the operation, he was left a practically deafened child after the operation. The proper procedure under such circumstances is to operate on the ear which is least useful in hearing and observe results. If there is little difference between the hearing on the two sides after this operation has been successfully carried out, then one is justified in operating on the other side.

It is a very important thing to get into the minds of the younger men that we are not advising operation of chronic suppurative ears because there is a discharge. We are operating on some of these cases because in connection with this discharge we have recognized a focus somewhere in the attic, aditus or antrum, a bone invading process which seriously threatens the patient's life. The operation is undertaken to get rid of this focus. Whether the operation results in a complete cessation of discharge is another matter. If the radical mastoid has as an end result the eradication of the focus of infection the object for which the operation was undertaken has been attained and it is of very little significance whether there is some moisture coming from the tube or tympanum. It seems to me a great deal of needless effort has been made to close the Eustachian tube. It is all very nice if the operation is successful in doing this, but if the operation is not successful, the physician should bear in mind that the object for which the operation was undertaken may nevertheless have been attained. A little discharge from the Eustachian tube is of no great significance.

I have time to say only a few words about one or two more of the clinical problems of chronic otitis media. First, about the labyrinthine complications: There are various types of labyrinth involvement. A not uncommon one is where a cholesteatomatous process erodes through the bony margin. This usually takes place in the floor of the aditus, erosion taking place into the horizontal canal. When the bone is once perforated the process rarely goes any further because the endosteum has resisting powers which the bone does not have. We speak of this as the circumscribed type of labyrinthitis. This process rarely results in a diffuse invasion of the labyrinth. Where an operation for the cure of the cholesteatoma seems clearly indicated, this should be carried out, avoiding disturbing the region of the fistula.

Diffuse invasion of the labyrinth from infection of the middle ear may be a serious menace because of the possibility of an intra-

cranial complication. We have been in the habit of speaking of two types of diffuse labyrinthitis—the serous and the purulent. In the former, there may be only a partial suppression of labyrinthine function, whereas in the latter a complete destruction is inevitable, but we have diffuse labyrinthitis which produces a temporary, complete suppression of function, but from which partial recovery may take place. In our text-books we have attempted to make too sharp a differentiation between the serous labyrinthitis and the purulent. All grades of inflammatory processes exist, from the mild serous to the destructive purulent process, exactly as we see taking place in otitis media, the simple serous catarrh and the mucopurulent and finally to the distinctly purulent disease, nor is it always easy to determine from our clinical examination which one of these labyrinth disturbances is the more likely. Naturally, where there is some vestige of function we can feel reasonably sure that the patient has a process which is very unlikely to result in a serious complication. On the other hand, we are not able to say that because there is a complete suppression of function, therefore the patient may not have a serous labyrinthitis from which he can make a partial recovery. About the safest guide that I have been able to follow has been this: Where there develops a diffuse labyrinthitis with a complete suppression of function, indications for operation upon the labyrinth are defined in two ways: first, if there are evidences of a threatened intracranial complication, headache, change in the cerebrospinal fluid, it is important that the operation for the exenteration of the labyrinth be carried out immediately. In the absence of such complications, the question of draining the labyrinth hinges entirely upon whether there exists independent of the labyrinth trouble indication for operation upon the mastoid. Where such an indication clearly exists then it is proper at the time of the operation also to drain the labyrinth.

HEMATOMA OF THE ANTRUM.

Dr. Martin Ross, New York.

Severe hemorrhage following trivial injury to the nose (either operative or otherwise) occurs with sufficient frequency to have been the experience of all rhinologists. Profuse hemorrhages resulting from surgery of the inferior turbinate and often of the middle turbinate, is likewise a common occurrence. Following the simple procedure of antrum irrigation, however, bleeding so alarming in nature as to threaten exsanguination, is distinctly an unexpected and rare complication.

M. F., female, age 26 years, came under observation at the New York Post-Graduate Hospital, complaining of symptoms warranting exploratory irrigation of the Antra of Highmore. Her past and family history were entirely negative.

The inferior meati were anesthetized by packing with cotton strips, saturated with 4 per cent cocain, to which 6 drops of 1-1000 adrenalin to the ounce had been added. As a result, the inferior turbinates shrank considerably, so that despite the presence of a huge right nasal spur, the site of entrance into the sinus under the inferior turbinate was reached on both sides with no abrasion to either the turbinate, the septum, or the floor of the nose. A Douglas antrum trocar was used, and entrance into the maxillary antra negotiated without the slightest difficulty. The return flow of irrigating fluid being bloodless, patient was accordingly permitted to leave the hospital.

About half an hour later while enroute for home, the right side of nose suddenly began to bleed. The hemorrhage became so profuse that patient was rushed back to the hospital and admitted as an emergency case.

Upon admission patient was pale with a light degree of shock, blood literally pouring from the right side of her nose. Sanguinous tears coursed over her right cheek, as the blood found its way up the naso-lacrymal duct, and out through the punctum.

The point of origin of the bleeding could not be determined. Adrenalin applied to the lateral wall of the nose, under the inferior turbinate, was washed out without effect. The nose was packed tightly with gauze, but bleeding continued out through the mouth. A postnasal plug was inserted and the right side of nose repacked. This partially controlled the situation but the patient's continual hawking loosened the plug with the resulting renewal of hemorrhage. The packing was, therefore, removed and a Bernay splint tucked beneath the inferior turbinate with very little benefit. Another "Bernay"

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placed tightly in the middle meatus soon controlled the situation. Evidently the bleeding had been coming from the middle meatus and not from the point of puncture. The splints were removed in thirty-six hours, with no return of bleeding. Transillumination of the antra at this time showed a marked clouding on the right side, similar previous examination having been negative. Patient was sent away for convalescence, returning in two weeks. During this time there had been no bleeding, patient's color gradually approaching the normal. Transillumination now showed some shadow on right side, but a marked improvement over the previous appearance. Four weeks later both antra transilluminated equally. No blood examinations were obtained, as patient, fearing further bleeding, refused to have this done.

Among the mass that has been written regarding accidents following antrum puncture, no mention has ever been made of the danger of hemorrhage. That this danger is remote, indeed, is attested to by its rarity, yet a review of the work of Gurlitz* leads one to wonder why this accident does not occur with greater frequency.

Gurlitz in an attempt to show the danger of air embolism following antrum puncture, observed in normal specimens, that the veins of the antral mucosa are very numerous. In 58 per cent of his specimens, he found a large plexus of veins either on the orbital or the nasal wall. The diseased antrum, with its thickened and polypoid mucous membrane, produces a venous plexus of much greater size.

A large number of deaths due to air embolism are caused by the injection of air directly into one of the veins described by Gurlitz. These veins when present, can easily be ruptured by the investigating trocar, and would make its appearance as brisk hemorrhage only after filling the antrum and spilling over through the normal osteum. This is what undoubtedly occurred in the case herein described, and explains the failure to check bleeding, until the region of the normal osteum was tightly packed.

It is a matter of conjecture as to whether or not a large percentage of cases showing a bloody return after irrigation by trocar puncture, is due to a wounding of the veins on the nasal wall of the sinus, rather than to an abrasion of the nasal mucosa beneath the inferior turbinate. Certain it is, that despite its infrequency, hemorrhage is a complication to be kept in mind, and together with the more frequent occurrence of air embolism, should lead one to regard the operation of antrum puncture with less contempt for its simplicity, and more respect for its possible dire sequellae.

302 East 18th Street.

*Acta-Oto-Laryn., Stockholm, 1920-21, No. 25.

BACTERIAL CONSTANTS OF THE UPPER RESPIRATORY TRACT.

Dr. S. J. Pearlman, Chicago.

An inquiry into the bacteriology of the upper respiratory tract must consider first, those organisms of endogenous origin wherein the offending agents find their habitat in the tissues of the individual as part of a normal flora; and the exogenous types wherein the bacteria are not already present, but are introduced from without under epidemic conditions through milk, contact, and droplet infection. Although the picture of the normal (endogenous) flora of the upper respiratory tract is not altogether constant, and is subject to individual, epidemic, and perhaps seasonal variations, late studies lead us to believe that the more common pathogenic organisms are present in more individuals and in higher numbers than was formerly suspected.

The scope of this paper will include only a brief consideration of the more important and constant bacteria of the pharynx and nasopharynx with special view to their occurrence, and to a lesser extent their cultural characteristics and pathogenicity.

The Hemolytic Streptococcus: There are numerous streptococci differing in many ways but alike in that they are able to hemolyze blood. We will consider only those affecting man and discovered normally in the upper human respiratory tract, especially in the deeper clefts and recesses of the tonsils and adenoids.

By "hemolytic streptococci" are meant those streptococci which on plain blood agar plates cause a wide clear zone of hemolysis about a small gray central colony. This zone is usually 2-4 m.m. across, but under varying conditions may be less or considerably more. Broth cultures of these streptococci when added to suspensions of red corpuscles will hemolyze in vitro, a test which is commonly used.[1]

On the basis of their fermentative reactions Holman, in a satisfactory classification, recognizes eight different varieties, although some strains grouped together very markedly in pathogenicity and other qualities. Smith and Brown have suggested two classes, depending on the amount of hemolysis, an alpha type with a very narrow zone and a beta type with a wider, clearer area of hemolysis about the central colony.[2]

Formerly the reports on the frequency of streptococcus hemolyticus varied considerably, but it is now definitely established that practically all tonsils harbor them, especially in the crypt bottoms, in

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large and often predominating numbers. (Thus, Pilot and Davis, 1918, 97 per cent; Pilot and Pearlman, 1921, 95 per cent).

The lower figures obtained by most former investigators can be explained by the fact that they employed swabcultures of the tonsil surfaces and pharynx. Furthermore, the data obtained prior to 1903 and the use of the blood agar pour plate method is in accurate because the differentiation of viridans types from the hemolytic strains was not satisfactory.[4]

The tonsil crypts as the chief feeding focus of hemolytic streptococci for the throat and respiratory passages have been repeatedly emphasized by D. J. Davis. Furthermore, he states that this organism is never persistently present on normal nasal mucosa; normal gums and sound teeth do not harbor them in large numbers and they are not present on the skin of persons who bathe frequently.[5] The gastrointestinal tract is normally free from them, but the adenoids, heretofore not considered a habitat, are now known to harbor hemolytic streptococci in large numbers and quite constantly in the slits and folds, which, though not as complicated, are quite analagous to the tonsil crypts and depressions.[6]

Although they have not been directly cultured it is not improbable that the tiny blind pits on the posterior pharyngeal wall are also sites where these organisms flourish. Considering the pathogenicity of the hemolytic streptococcus and ignoring the animal diseases due to this organism, man himself is quite susceptible and the list of diseases due to it is impressive, varying as it does from puerperal sepsis, endocarditis, erysipelas, pneumonias of a special type, as well as infections of the throat and nose. The organism has a marked ability to rapidly acquire increased virulence during epidemics, especially, and from playing an important role as secondary invader often becomes aggressive enough to become a primary agent. Particularly was this noticeable in the influenza epidemics of the recent past, as well as in the measles epidemics encountered in the military camps of the war period.

The Influenza Bacillus (Pfeiffer): Identification and morphology: The identification of the influenza bacillus may be considered fairly complete if in pure culture it has the following characteristics, *i. e.*, appearing as a small gram negative, nonmotile, polar staining bacillus growing on media containing hemoglobin, and demonstrating the property of symbiosis; *i. e.*, more profuse growth about a foreign colony.[7]

The organism may be grown on 10 per cent blood agar and especially on the so-called chocolate medium. This consists of infusion

agar to which defibrinated human blood is added in 5 per cent proportion and the whole heated at 90 for five minutes.[18]

On this brown chocolate medium the organisms grow freely as large, gray, flat colonies, whereas on ordinary blood agar the colonies are tiny, translucent and dew drop, with a strong tendency to grow around other colonies.

Microscopically the bacilli appear as small gram negative rods; some strains showing a uniform size. In others thread-like forms with considerable variation in individual size occur, while some are quite coccoid.

Influenza bacilli have often been recovered from the throats of normal individuals. The incidence reported varies rather markedly. In 1907, Davis reported their presence in 2 of 20 healthy individuals (10 per cent). Others more recently report them frequently in percentages varying roughly from 42 to 76 per cent,[10] but these figures are based on cultures from saliva or swabs of the pharynx and nasopharynx.

From the extirpated tonsils and adenoids of 115 normal persons the bacilli were recovered in 40.9 per cent and 53.9 per cent respectively, and from nasopharyngeal swabs in 40 per cent.

The Incidence of Influenza Bacillus (Pfeiffer) in the Culture of Nasopharyngeal Swabs, Adenoids, and Tonsils.[6]

		Number of Persons	Percentage Positive
Series 1.	Swabs	25	40.0
	Adenoids	25	44.4
	Tonsils	25	48.0
Series 2.	Adenoids	90	38.8
	Tonsils	90	55.5
	Total number of adenoids from which cultures were made	115	40.9
	Total number of tonsils from which cultures were made	115	53.9

crypts and adenoid folds, but in higher percentages than on the surface of these structures, which in healthy individuals must be considered foci in which influenza bacilli (Pfeiffer) flourish frequently.

That Pfeiffer's bacillus is the cause of influenza is still a moot question with perhaps the preponderance of evidence against this notion. There is no doubt that the influenza bacillus is pathogenic for man, it having been recovered in pure culture from cases of meningitis[22] and the bronchopneumonia which often accompanies the former. Experimentally introduced under the skin suppurative lesions occur, and it will kill laboratory animals (inoculated intraperitoneally and into the meninges) when used in large doses.

As for its being the cause of the various epidemics of the past, Davis sums up the evidence against it as follows:[23] "It is not con-

stantly found in influenza by most observers. It is found commonly or more commonly in other diseases as pertussis. Inoculated into human beings it does not cause the disease; nor can it be produced by animal inoculation. The organism is pyogenic and causes leucocytosis; the primary blood picture in influenza is a leucopenia. Prophylactic influenza inoculations fail to protect appreciably against the disease; and its presence in influenza, which is prone to secondary invasions, may be explained on the basis that the bacillus is a ready secondary invader in many respiratory diseases."

Green Producing Cocci: On media containing hemoglobin, there are three types of green producing cocci, namely: the pneumococcus, streptococcus viridans, and the Mather's type of organism. The first two are quite common in healthy individuals and usually have been isolated from saliva, and less frequently from swabs of the throat and pharynx.

On blood agar plates, the pneumococcus appears in small colonies, flat, often umbilicated or checker-like, surrounded by a green zone of methemoglobin and revealing lancet-shaped diplococci.

Streptococcus viridans occurs in small round, gray, convex colonies with a similar green zone, while the Mather's type of streptococcus grows in colonies which are quite large and moist, with a mucoid appearance and a tendency to become confluent.

Of these green producing cocci the bile soluble and inulin fermenting types are classed as pneumococci, while the others are considered as streptococcus viridans. The crypts and slit-like folds of the tonsils and adenoids of normal individuals harbor these organisms constantly and in large numbers.[12]

The Incidence of Streptococcus Viridans and Pneumococcus in Cultures of Nasopharyngeal Swabs, Adenoids, and Tonsils.[13]

		Number of Persons	Percentage Positive Pneumococcus	Strep. Viridans
Series 1)	Swabs	21	71.4	90.5
	Adenoids	21	71.4	90.5
	Tonsils	21	66.6	81.0
Series 2)	Adenoids	82	62.3	88.0
Total Number Adenoids		103	65.0	89.0

Furthermore, they are more numerous in the depths between folds of the adenoids than on nasopharyngeal surfaces.

The Incidence of the Pneumococcus in the Throats of Healthy Persons.[14]

Park and Williams	About 50%	1905
Lonscope and Fox	About 50%	1905
Buerger	About 50%	1905
Dochez and Avery	58.4%	1915
Stillman	About 45%	1916
Pilot and Pearlman	65%	1921

The Diphtheria Bacillus: Diphtheria bacilli in carriers are harbored almost always in the tonsils and adenoids. That the tonsils were the foci has long been known, numerous observers having found them in cultures from tonsilar swabs and from the extirpated gland.[15] The organism is present on the epithelial surface, within the crypts[16] and in the tissues between the epithelium.

The adenoids have been little studied until recently.[18] In a series of 100 adenoids and tonsils, cultures were made from tonsilar crypts, adenoid surfaces and also between the folds of the latter.

Diphtheria bacilli were recovered in 12 instances, two of these strains being virulent, and pseudo-diphtheria bacilli were recovered from the tonsils in 17, and from the adenoids in 30 instances. The somewhat higher figures than most investigators obtained here is due to culturing to the tonsil crypts and adenoids, rather than culturing of the swabs of the throat.

Tonsillectomy and adenoidectomy, removing as they do the chief foci of the diphtheria bacillus, nearly always cures the carrier.[19 20 21]

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29 East Madison Street.

LARYNGEAL CANCER, ITS TREATMENT, WITH SPECIAL REFERENCE TO TOTAL LARYNGECTOMY.*

Dr. Fielding O. Lewis, Philadelphia.

To treat laryngeal cancer intelligently, one must bear in mind its clinical classification, for the location and extent of the lesion determines the method of treatment and, to a large extent, the life of the patient. The familiar classification is: first, the intrinsic, arising from the vocal chords, ventricles, ventricular bands, interarytenoid and subglottic area; and second, extrinsic, arising from the epiglottis, arytenoids, aryepiglottic folds, pyriform sinuses and the pharyngeal surface of the cricoid cartilage.

Statistics show that the intrinsic forms are the types most frequently seen, and that the vocal chords are the structures more often involved, it develops slowly, does not extend rapidly and metastasis is late, due to the confined arrangement of the laryngeal lymphatics. Because of its own particular lymphatic arrangement, cancer of the larynx, perhaps, more than any other organ of the body, affords the surgeon a better chance for a complete eradication, provided it has been recognized before it has extended beyond the confines of the cartilaginous box.

The extrinsic forms, on the other hand, have a rapid course, metastasis occurs early and operative procedures are much less hopeful, it is therefore obvious that an early diagnosis is of prime importance. To wait until painful phonation, odor, cachexia and dyspnea are present, is to defer until all hope has usually passed; second, but by no means less important, is the promptness in carrying out the most effectual form of treatment. You may ask how is a definite diagnosis to be made since much is written against the advisability of a biopsy, as in the opinion of some it may cause a rapid dissimulation? I would reply that a biopsy should be made in all cases, provided the patient's consent has previously been obtained by the surgeon to carry out at once whatever treatment he may deem best in the interest of the patient. I am quite convinced that I should not want my larynx split open or removed without a tissue diagnosis having been first made by an accomplished pathol-

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ogist. I have seen several cases that clinically were carcinomatous, but proven otherwise by biopsy and visa versa.

Cases of intrinsic carcinoma in which it is possible to excise the entire growth over an area sufficiently wide to include normal healthy tissue, are best treated by laryngo-fissure. The records of Jackson, St. Clair Thompson and others, show that 80 per cent of this type of cases are cured by this method. All other operable cases should, in my opinion, be treated by the more radical method of total laryngectomy. After a careful study and analysis of a large series of laryngeal carcinomas seen in conjunction with Dr. Jackson, in private practice and at the Radiological Clinic of the Philadelphia General Hospital, I am firmly convinced that surgery offers, by far, the greatest hope for the relief of this distressing and frightful malady, and I conscientiously believe that all operable cases of carcinoma of the larynx should be treated by surgery when possible.

Radium and Roentgen ray are, in my opinion, invaluable agents in the postoperative treatment of this disease, and their use in preoperative treatment, in extrinsic cases, are often of great value in preventing the extension of metastasis. To treat willingly operable cases with these agents with no thought of surgery is, to my mind, a grave error.

The operation for total extirpation of the larynx was condemned by some laryngologists until recent years, because of its high mortality rate, by others because of the adverse criticism contained in the textbooks and other writings on this subject. I am sorry to note that in some of the modern textbooks, the following quotations are noted; one writer states: "If the operation succeeds, the patients lead such a feeble and painful existence that they might as well have succumbed to the original disease"; another: "Laryngectomy usually results in death within three years, even although recurrence may not have taken place"; and still another says: "Profound nervous depression and great fear of suffocation may follow it"; and many other equally depressing views are found. With improved technique and improvement in the after-treatment, the mortality has been greatly reduced, especially in the intrinsic cases. Of the forty-nine cases on whom I have performed this operation, not one has presented any symptoms of great mental depression or led a feeble and painful existence, but, quite to the contrary, they are mentally alert, enjoy a happy and useful life and in most instances are pursuing their previous occupations. Without the operation they could not have survived.

Many authentic cases with extrinsic inovlvement, which require extensive dissections, are reported living after many years, without

recurrence. Since the advent of the radio knife, I am quite optimistic in cases that were formerly thought to be inoperable. Laryngectomy is a formidable operation and the convalescence is often long and tedious, but what is that compared to long months of pain, sleepless nights, starvation and finally death? The patient must decide:

"I am the master of my fate,
I am the captain of my Soul."

Total laryngectomy may be performed by the one-stage operation or the two-stage operation. Some surgeons prefer the one-stage operation when possible, because the field of operation can be rendered more aseptic, therby insuring a better chance of primary union, requires less time, consequently less shock to the patient, and better handling of the tracheal stump, so as to secure a better tracheal opening, while the advocates of the two-stage operation claim that there is less danger of medistinal infection. My personal preference is the one-stage procedure.

Preparation of the patient. The patient should be admitted to a hospital at least three or four days before the operation, so that a complete physical examination by an accomplished internist may be made, this to include chemical and serological blood examinations and roentgengram studies of the chest, in order to determine whether the patient is a suitable surgical risk. Should any malady be detected which would contraindicate operation and its correction not possible, the operation would be ill advised. Careful inspection of the nose and throat should be made to exclude paranasal sinus disease and chronic cryptic tonsilar disease, the presence of which would prolong convalescence and may lead to serious complications. Infected teeth are removed and dental hygiene carefully carried out by an expert dentist. The diet is restricted. Free elimination through the bowels and kidneys are essential.

Anesthetic: Local and general anesthesia, both have their advocates and a combination of the two is used by some. To determine the kind of anesthetic and its method of administration, the operator should consider the temperament and general condition of the patient and the competency of the anesthetist, as often quoted, "The best anesthetic is a good anesthetist". If the lumen of the larynx is sufficiently large to permit free and unobstructed breathing or if a previous tracheotomy has been done, I personally prefer rectal anesthesia by the ether and oil method if administered by an expert and careful anesthetist. By its method less ether is required and the absence of any ill effcts that often follow other forms of anes-

thesia have been quite noticeable. Ether anesthesia by the drop method is perhaps the safest and the one most frequently used. Opium derivatives should not be administered, as the cough reflex is a great aid in the expulsion of foreign secretions from the lungs.

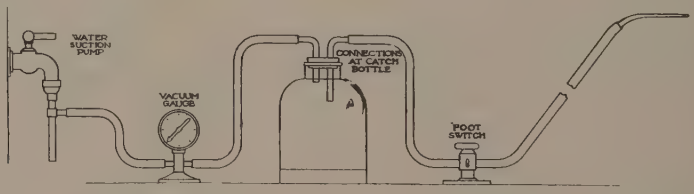
Operative technique shown by lantern slides. Presentation of two patients.

FOOT VALVE FOR SUCTION APPARATUS. A DEVICE TO INCREASE ITS EFFICIENCY.

Lee M. Hurd, New York.

This foot valve is to hold the vacuum until required.

The ordinary suction apparatus of the water filter pump type has a very low vacuum unless the tube from the pump is closed; then the vacuum will rise in proportion to the water pressure. With 65 pounds water pressure the vacuum will reach 27 inches and by confining this vacuum with the foot valve there is a reserve that is strong and efficient. Also, whenever less vacuum is required, it is easily reduced by keeping the valve open until the vacuum registers the amount wanted. The suction continues just as long as the foot holds open the valve.



The rubber tubing from the pump and bottle is passed through the foot apparatus and the tubing is compressed by the apparatus and acts as a valve, pressure with the foot releases the compressed rubber tubing, permitting the air to rush through to overcome the vacuum.

The drawing shows the pump connected to water faucet and from pump thick walled rubber tubing extends to a vacuum gauge, then to a large bottle, at least 5-pint in size, the larger the better reserve; then the tubing passes through the foot shutoff, which constantly compresses the tubing and is only released by pressure with the foot from here. The tubing extends as long as is necessary to be connected with whatever instrument is required.

39 East Fiftieth Street.

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SPONTANEOUS NYSTAGMUS, VESTIBULAR AND FUNCTIONAL HEARING TEST FINDINGS AS AIDS IN THE DIFFERENTIAL DIAGNOSIS OF INNER EAR AND EIGHTH NERVE AFFECTIONS.*

Dr. George W. Mackenzie, Philadelphia.

When your Chairman and Secretary suggested the above subject for this evening's paper, the writer accepted their decision as evidence of an increasing popularity of the vestibular and functional hearing tests and a desire on the part of those who may have done less to learn how those who have done more make use of these tests in the diagnosis of their cases.

For a while it looked as though the labyrinthine tests were doomed to oblivion on account of the unfortunate publication of quite a number of articles on the subject by those who had conducted little or no researches in this field. For a while it looked as though nearly every writer on the subject of the labyrinth had a particular theory to expound. As a result those who were dependent upon what they read for their introduction to the subject were confused and as a result were forced to abandon the subject in despair. The attitude of some of the thinking neurologists was neither hopeful nor encouraging. Realizing this state of affairs and with a desire to have the profession hold fast to that which was true and not throw away the grain with the chaff, the writer presented a paper on the subject of, "Careful Technique in Making the Labyrinthine Tests", before the American Academy of Ophthalmology and Oto-Laryngology, in 1917, in which he pointed out that most of the erroneous conclusions arrived at up to that time were due to false premises, *i. e.*, faulty observations because of faulty technique in making the tests. In that particular paper the writer went so far as to point out some of Barany's errors and how they came to be made.

In view of the above mentioned conditions it is encouraging to one who is intensely interested in the subject to be invited to present his clinical experience in the diagnosis of ear conditions from the findings revealed by the so-called labyrinthine and functional hearing tests. The time limit will permit of but a fragmentary presentation of the subject. Many things of interest must necessarily be omitted.

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Let us consider first those labyrinthine affections secondary to middle ear suppuration. According to their extent they may be divided into *A*, the circumscribed, and *B*, the diffuse. According to the character or intensity of the inflammation present they may be divided into *1*, irritative, and *2*, destructive.

The circumscribed labyrinthine affections secondary to middle ear inflammation may be limited to one of the canals (the external most frequently), to the vestibule or to the cochlea.

A, 1: Circumscribed irritative labyrinthine affection may be met within the course of middle ear suppuration, acute or chronic. In the chronic cases there is frequently associated a cholesteatoma which, in its growth, causes a resorption of the bony prominence, eventually producing a fistula of the bony external semicircular canal, leaving the membranous canal intact, but congested. Occasionally the congestion of the membranous semicircular canal occurs in the absence of a fistula of the osseous canal. In a case of this kind the outstanding symptoms and signs are as follows:

1. More or less vertigo: In this case, a false sensation of turning in the horizontal plane toward the affected side.
2. Equilibrium disturbance: Reaction movements in the direction opposite to the vertigo.
3. Spontaneous horizontal, nystagmus toward the affected side, which is increased when looking toward that side and decreased when looking away from it.
4. After-turning, horizontal, nystagmus increased above the normal (24 seconds) to both sides; and more so toward the affected than the unaffected side.
5. Caloric reactibility is preserved.
6. Galvanic reactibility is preserved.
7. Fistula test is positive if a fistula is present, but a fistula is not always present. When a fistula is present compression of air in the external auditory canal will usually produce a horizontal nystagmus toward the same side, providing large polyps in the external auditory canal do not interfere with the test or there is not an overly patulous Eustachian tube to permit the escape of air in that direction. Wherever a fistula of the osseous external semicircular canal is present with an intact membranous canal and there is nothing to interfere with the piling up of air pressure in the middle ear spaces, there occurs the so-called compression nystagmus, which consists of a horizontal rhythmic nystagmus toward the same side; and when

aspiration is applied there occurs the so-called aspiration nystagmus which consists of a horizontal nystagmus in the same plane, but opposite direction to and less intensive than the compression nystagmus. The aspiration nystagmus is less intensive for the reason that it is not possible to obtain so intense a negative pressure as it is a positive one.

The functional hearing tests are not influenced in cases of circumscribed lesion of the labyrinth so long as the affection is limited to the external semicircular canal. The fork findings will, therefore, be the same as those which are characteristic of obstructive deafness. pure and simple.

We shall not discuss at this time the findings of circumscribed irritative lesion of the other parts of the labyrinth for the reason that they are relatively few as compared with lesions of the external semicircular canal. The writer was afforded the opportunity of studying closely a case of circumscribed irritative lesion of the posterior semicircular canal, which is quite rare. To report this case properly, that is to do it justice, would require at least a half-hour, possibly longer.

A, 2: Circumscribed destructive lesion of the labyrinth secondary to middle ear suppuration may occur in any part of the labyrinth, but again, the most common site is the external semicircular canal. The difference pathologically between this and the previously mentioned condition is one of intensity. A destructive lesion is but a more advanced stage of an irritative one. The irritative is due to the seeping into the membranous external semicircular canal of toxins generated by the bacteria present in the middle ear. If the suppuration in the middle ear is not cleared up in the course of time the barriers fail to check longer the pus organisms, when they find their way into the semicircular canal with resulting suppuration. If this suppuration remains limited to the canal we have a circumscribed destructive lesion of the labyrinth.

In the case of a circumscribed destructive lesion of the external membranous semicircular canal with or without a fistula of the osseus canal, we find characteristically:

1. Vertigo, always present in a recent case; while in a latent one (of a few weeks or longer standing), the vertigo is but slight and is elicited only upon quick movements of the head. The subjective sensation of vertigo when present is one of turning in the horizontal plane away from the affected side.

2. Equilibrium disturbances (reaction movements) are axial and in a direction opposite to the vertigo (false sensation of turning).

3. Spontaneous horizontal nystagmus is present and is directed away from the affected side.

4. The horizontal after-turning nystagmus is decreased below the normal (24 seconds) to both sides, but especially toward the affected side. It is reduced in the average case toward the unaffected side to about 16 seconds and toward the affected side to about 8 seconds. The rotary after-turning nystagmus is not changed.

5. The caloric reaction is preserved for the vertical canals, but lost for the horizontal. In other words, so far as the vertical canals are concerned when cold water is syringed into the external auditory canal with the patient's head erect, there follows a purely rotary nystagmus toward the opposite side, as occurs in normal individuals. On the other hand, if the head of the patient is inclined to the opposite shoulder so that the horizontal (external) semicircular canal lies quite in the vertical plane, there follows no horizontal nystagmus toward the side syringed with cold water as occurs in the case of an intact or even hyperirritable (congested) external semicircular canal.

6. The galvanic reaction is preserved in this as in all cases of labyrinthine affections with intact VIII nerve.

7. The fistula test so far as the destroyed (suppurating) semicircular canal is concerned must be negative since there is nothing to react, even in the presence of a fistula of the osseous semicircular canal.

8. The functional hearing test findings, so long as the lesion is a circumscribed one limited to the nonacoustic labyrinth, are not altered. In other words, the findings are characteristic of obstructive deafness because of the middle ear disease.

B, 1: Diffuse labyrinthine irritation secondary to middle ear suppuration must be a very rare condition, for the reason that in most cases the bacterial toxins in the middle ear invade the labyrinth at one location only (the external semicircular canal, the oval or round window or the promontory). It is a very unusual coincidence for the labyrinth to be invaded at several places simultaneously. Diffuse congestion is more likely to occur in the course of general diseases in which the toxin circulates through the general blood stream. Diffuse irritative labyrinthitis could possibly occur in the course of middle ear suppuration as a result of congestion, the forerunner of a diffuse suppurative labyrinthitis. The duration of the congestive stage of labyrinthitis is variable, but on the average it is a matter of hours rather than days or weeks. However, it is possible in exceptional cases for the process to be arrested in the congestive (pre-

suppurative) stage with more or less complete restoration of function. The fact is that our knowledge of diffuse labyrinthine irritation secondary to middle ear suppuration is considerably limited because it is found but rarely in comparison with the other forms of labyrinthine affection.

The symptoms and signs are as follows:

1. Vertigo, much like that found in the circumscribed irritative affection of the external semicircular canal recorded above may be present. However, there is a difference, in that, in the case of the circumscribed lesion of the labyrinth the vertigo is usually less intensive than in the diffuse lesion. Again, the false sensation of motion is limited to the horizontal plane in the former condition, while in the latter it is a sensation of combined turning in the horzontal and a falling sensation in the frontal plane. In both cases the direction of the false sensation of turning, or falling, is toward the affected side.

2. Equilibrium disturbances (reaction movements) are both axial and frontal so that the patient falls in a direction opposite to his vertigo. In other words, he falls away from his affected side.

3. Spontaneous, mixed, horizontal and rotary nystagmus is toward the affected side, since all canals are affected simultaneously and not a single one as happens in the case of a circumscribed lesion.

4. The after-turning nystagmus for both the horizontal and the rotary is increased above the normal to both sides, but more so toward the affected side.

5. The caloric rection is preserved for all canals.

6. The galvanic reaction is maintained.

7. The fistula test may be positive or negative. When the fistula sign is present it speaks for a fistula of the osseous labyrinth with a reactive membranous one and nothing more. It does not tell us whether the membranous labyrinth is functioning more or less than normal.

8. From the standpoint of the hearing apparatus, there is usually Tinnitus aurium present. At the same time the presence of the tinnitus may so influence the functional hearing test findings as to cause them to be no longer of the purely obstructive type. In other words, though a negative Rinne may be found the bone conduction is not so long as it ought to be for a case of pure obstructive deafness, nor is it short enough to be characteristic of perceptive deafness. As the diffuse labyrinthine congestion improves the functional hearing test findings lose that element (relative shortening of the bone conduction) which speaks for perceptive deafness.

B, 2: Diffuse labyrinthine destruction secondary to middle ear suppuration compared with the preceding condition is relatively frequent. It is synonymous with diffuse labyrinthine suppuration. This was the earliest recognized clinical entity made possible of exact diagnosis by the aid of the various labyrinthine tests, so ably developed by Barany and the other associates of Politzer during the first decade of the present century. The symptoms and signs are as follows:

1. *Total* deafness of *sudden* onset in the course of middle ear suppuration. The best method for determining total deafness is the combined use of the speaking tube and the noise producer. For instance, if the right ear is the one in question, we introduce into the external auditory canal of that side, the receiving end of a long (2 or 3 meter) speaking tube and into the other ear the receiving tip of a noise producer. While an assistant operates the noise producer, the examiner talks to the patient through the bell end of the speaking tube, using both the conversational and the whispered voice. If the patient is not able to recognize conversational voice, spoken into the tube, it may be accepted as ample evidence, in fact the best we have up to date, of total deafness.

2. Vertigo is present in recent cases. It is less evident in latent ones. The vertigo of diffuse suppuration is more intense than that of a single canal affection. The subjective sensation is one of combined falling and turning toward the side opposite to the lesion.

3. The equilibrium disturbance is manifested by actual falling or turning on the part of the patient toward the side of the lesion. This occurs because of his efforts to correct the false sensation (vertigo) of falling and turning to the opposite side.

4. Spontaneous, mixed, horizontal and rotary nystagmus is directed toward the side opposite the affected ear, that is, away from the lesion, so to speak. The nystagmus is quite pronounced early, but gradually diminishes, until it becomes *nil* or almost *nil* after a few weeks or months. However, the writer has seen several cases in which there was a minimal degree of nystagmus present a year after an operation for the exenteration of the labyrinth.

5. After-turning *horizontal* nystagmus is diminished toward both sides, but more so toward the affected one. The most characteristic findings in a recent case is 16 seconds duration for after-turning nystagmus toward the unaffected side and 8 seconds duration toward the affected side. These figures gradually change so that after several months they become 13 and 11 seconds. However, the sum of

these two figures equals 24 seconds as it did above, that is, 16 plus 8 equals 24 seconds as compared with the normal, 24 seconds to each side.

The after-turning *rotary* nystagmus in a recent case is about 12⅔ seconds toward the unaffected and 6⅓ seconds toward the affected side. These figures gradually change, when after several months or a year they are approximately 11 and 9 seconds. Again, the sums equal the same in a latent as in a recent case; that is, 20 seconds. The figures in the oldest case the writer has seen have never been exactly the same on the two sides. It is always a trifle less toward the affected than the unaffected side.

6. The caloric nystagmus is *nil*. No amount of cold water syringed into the ear for long periods will alter the already existing nystagmus no matter in what position the head is placed.

7. The galvanic reaction is positive on the affected as well as on the unaffected side by reason of the fact that the electric current reacts upon the nerve, even where the inner ear is destroyed.

8. The fistula test is negative even in the presence of a fistula since the end organ in the Crista ampullaris has been destroyed by reason of the diffuse suppurative (destructive) process in the labyrinth.

Diffuse serous labyrinthitis secondary to middle ear suppuration is a condition referred to by quite a few writers; which, to those who have reported cases presents all the symptoms and signs of labyrinthine destruction like that found in suppuration. The only difference in the two conditions is that in the case of serous labyrinthitis there is more or less restitution of function after the attack has passed over; while in the case of suppuration no restitution of function is possible. The writer has seen at least seventy-five cases of suppurative labyrinthitis, practically all of them carefully studied by himself; whereas, he has not seen a single case of serous labyrinthitis. During his three years' stay in Vienna, much of which was spent in the Politzer Clinic, he would rarely hear about a case of serous labyrinthitis and then only during the course of someone's lecture; but when investigated they usually turned out to be cases of suppurative labyrinthitis. Serous labyrinthitis is rather difficult to prove, even though it be present. On the other hand, that the writer has not seen a case does not prove the nonexistence of serous labyrinthitis. He merely wishes to point out the fact that if it does exist it must be an extremely rare condition.

There is another form of destructive labyrinthitis which presents almost the identical symptoms and signs of diffuse suppurative labyrinthitis. It is a condition which the writer has chosen to designate perilabyrinthitis. A condition in which the infection involves the perilabyrinthine pneumatic cells (extension from the mastoid). In this condition the osseous labyrinth necroses and sequestrates.

This is not a rare condition. Almost every otologist of experience has seen at least a few cases of the kind. There is commonly an underlying dyscrasia, tuberculosis, syphilis or diabetes, associated with the mastoiditis.

The symptoms and signs of perilabyrinthitis are the same as those of diffuse labyrinthine suppuration, plus a facial paralysis. Involvement of the facial nerve occurs since the facial canal falls to the ground under the same conditions which produced the necrosis and sequestration of the labyrinthine capsule.

There is still another form of diffuse labyrinthine destruction secondary to middle ear suppuration of the chronic form. In this connection the writer recalls having been asked on more than one occasion, "Do you advise operating upon every labyrinth in which you find symptoms of labyrinthine destruction"? The answer has been "no" for the reason that there exists a destructive process of the labyrinth which is very chronic and nonsuppurative; namely, chronic plastic labyrinthitis, which causes a gradual, but progressive metaplasia of the end organs. Thus it is possible to have clinically identical end results in two separate conditions, acute suppurative labyrinthitis and chronic plastic labyrinthitis.

In addition to the diffuse destructive forms of labyrinthine affection, secondary to middle ear suppuration, in which we find total deafness and total loss of vestibular function, there exists other forms of destructive labyrinthine inflammation; namely, that form of labyrinthitis which is found rather late in the course of hereditary syphilis. It occurs as one of the manifestations of the so-called Hutchinson's triad, which includes: *1*, the characteristic malformation of the teeth; *2*, interstitial keratitis; and *3*, deafness. Labyrinthitis syphilitica tarda is the name which seems to best fit this condition since it appears rather late, between the fifth and thirtieth years of life, in children born of syphilitic parents, and the pathology is limited to the labyrinth. The affection is bilateral. It is only slightly amenable to the usual forms of antisyphilitic treatment. The obstinacy of this disease is comparable with that of interstitial keratitis. The symptoms and signs are as follows:

1. Bilateral deafness, which is usually very pronounced and occasionally complete. The progress tends to be very rapid. The functional hearing tests reveal findings characteristic of deafness of the so-called perceptive type.

2. Vertigo is not a constant symptom of the affection for the reason that the loss of vestibular function is bilateral, in which case there is not the same imbalance of vestibular function as occurs in unilateral loss of function.

3. Equilibrium disturbances are present, but are not identical with that found in unilateral destruction of the labyrinth. The patient is fairly able to retain his balance with the eyes open, but with the eyes closed the ability to maintain perfect equilibrium is considerably impaired. This impairment is more evident when the patient attempts to walk. There is not, however, the pronounced equilibrium disturbance with the eyes open, as occurs in the recent cases of unilateral destruction.

4. Spontaneous nystagmus is less evident in this affection than in the unilateral forms of labyrinthine destruction. In fact, it is only found in the very recent cases and where the degree of destruction is appreciably more marked on one side than on the other. In later cases and in those where the destruction of the labyrinth is about equal on the two sides there is no spontaneous nystagmus.

5. The after-turning nystagmus is materially diminished and in some cases entirely lost on both sides.

6. The caloric reaction is appreciably diminished and in some cases entirely lost on both sides.

7. The galvanic reaction is both positive and normal on both sides, even in those cases where there is not the least sign of after-turning nystagmus or caloric response. It is this normal reactibility of the VIII nerve to galvanism which tells us that the loss of hearing and vestibular function is due to a pathologic process limited to the inner ear. Besides, it helps us to distinguish this process from another form of syphilitic deafness (Neurolabyrinthitis syphilitica), about which more will be said later.

There remains still another form of diffuse destructive labyrinthine affection worthy of our consideration, and that is cases of basal skull fractures involving the petrous bone, particularly those in which the fracture is comminuted or where the edges of the fracture override one another. This is a fairly common injury. It is an injury which calls for consultation with an otologist. According to Bezold about one-fourth of all basal fractures pass through one

or both temporal bones. The symptoms and signs of basal fracture involving the petrous bone are briefly as follows:

1. Bleeding from the ear. Concerning this symptom, which is a very important one, a distinction must be made between blood and blood mixed with cerebrospinal fluid. When the blood is unmixed with fluid, it appears thick and tends to coagulate promptly. When the blood is mixed with fluid, there is apparently no tendency to coagulation. The flow in this latter instance will tend to keep up for days. In the former instance the fracture has not involved the dura, while in the latter instance it has. Where the dura is intact there is less likelihood of leptomeningitis complicating than in those cases where the dura has been lacerated. Furthermore, where the flow from the ear is free and long continued, the loss of hearing and of vestibular function will be permanent, even though the patient, otherwise, recovers.

2. Facial paralysis is quite common in the cases of the more severe fractures (comminuted with overriding edges).

3. Complete loss of hearing in the more severe cases is comparable with that found in labyrinthine suppuration.

4. Severe vertigo is present like that found in labyrinthine suppuration (see above).

5. Equilibral disturbances are present like that found in labyrinthine suppuration.

6. Mixed rotary and horizontal nystagmus is directed toward the intact side in cases of unilateral involvement. In cases of bilateral involvement the patient is usually in such bad shape that there is but little, if any, opportunity afforded to study the symptoms and signs carefully. Even in some of the unilateral cases the fracture is so extensive that the patient is already comatose when seen. In this case the examiner finds a conjugate deviation of the eyes directed toward the affected side in place of the nystagmus directed toward the unaffected side, observable in the conscious patient.

7. The after-turning nystagmus findings are characteristic of those found in a destroyed labyrinth from any cause.

8. Caloric reaction is negative on the affected side. It is well to emphasize here the fact that this test should never be attempted in cases of injury of any kind in which there is a recent rupture of the drum membrane because of the risk of washing bacteria from the external canal into the tympanic cavity with resulting infection that endangers life.

9. The galvanic reaction is variable, depending upon the course of the fracture and the structures involved. It is not characteristic. On the other hand, where the reaction is negative there is reason to suspect the fracture to be more extensive than where it is found to be positive.

The preceding condition (fracture of the petrous bone involving the labyrinth and the facial nerve) is not the only kind of fracture of the temporal bone that occurs. We meet with fractures of the temporal bone in which the petrous portion escapes. Fractures in which there is a flow of blood or blood mixed with cerebrospinal fluid, just as may occur in the previously described petrous bone fractures. They are fractures which pass through the squamous bone, involving the tegmen, tympani and antri, and in which there occur no symptoms referable to the acoustic or nonacoustic labyrinth. The impairment of hearing in these cases is characteristically that of obstructive deafness.

A great deal more could be said about the subject of fractured skulls involving the temporal bone if time permitted. It is a borderland subject which belongs quite as much, if not more, to the otologist than the neurologist or the general surgeon. It is a subject which the otologist appears to be more willing to share with the general surgeon than the general surgeon appears to be willing to share with the otologist, judging by the neglect of attention this class of cases receive in the average hospital.

Owing to the length of time already consumed the writer will refrain from discussing the subject of neuritis of the VIII nerve at this time further than to refer briefly to but one very common form, and the reason for including mention of this particular one is the fact that reference was made to it above, when speaking of deafness of congenital syphilitic origin. The condition referred to is Neurolabyrinthitis syphilitica, a subject about which the writer has already written quite freely.

The pathology is that of a meningoneurolabyrinthitis of acquired syphilitic origin. The process begins in the meninges and spreads peripheralward along the sheath of the nerve to the spiral ganglion in Rosenthal's canal and in rare cases it extends as far as the intralabyrinthine spaces. The symptoms and signs are as follows:

1. There is bilateral deafness, which is rarely so pronounced as that found in the congenital syphilitic form of deafness. Again, in the acquired form there is likely to be a greater difference in the intensity of the involvement on the two sides. The functional hear-

ing tests show the same general characteristics in both conditions, that is, deafness of the perceptive apparatus type.

2. Vertigo is more likely to be present in Neurolabyrinthitis syphilitica than in Labyrinthitis syphilitica tarda, for the reason that an imbalance in the intensity of the involvement on the two sides is more common in the acquired than in the congenital form.

3. Equilibrium disturbance is more often met with in the acquired form than in the congenital for the reasons given in the preceding paragraph.

4. Nystagmus is more common in the acquired than in the congenital form of affection for the same reasons as given in the preceding paragraph.

5. The after-turning nystagmus is diminished appreciably, but as a rule, not to the same degree as in the congenital disease.

6. The caloric reaction is more likely to be present in the acquired than in the congenital affection.

7. The electrical reactions are seriously impaired in the acquired form while it remains quite normal in the congenital. This is the most important differential finding in these two conditions.

Tumors, including gumma of the temporal bone, involving the labyrinth and tumors of the internal auditory canal involving the VIII nerve are subjects in themselves and must necessarily be omitted in a limited paper.

The intention of the writer before he began the preparation of this paper was to present in the most concise form the differential diagnosis of inner ear and eighth nerve affections by the aid of the vestibular and hearing test findings. He finds that he has not succeeded as well as he had hoped, in that he has consumed more time than he anticipated and left a good deal of importance unsaid.

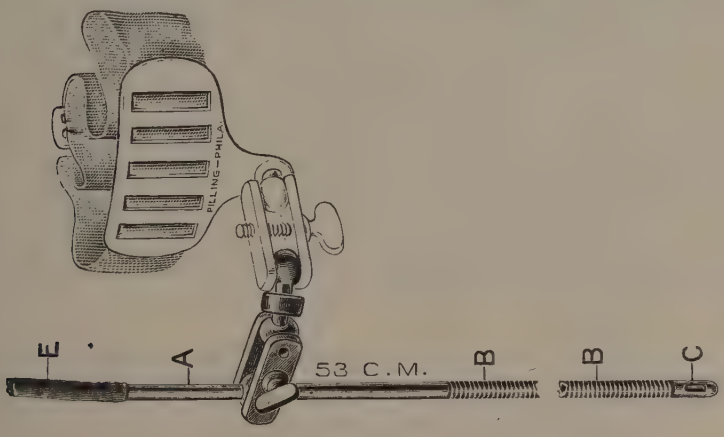
1724 Spruce Street.

BRONCHIAL FLEXIBLE ASPIRATOR.

Dr. William Frederic Moore, Philadelphia.

An instrument designed for retention in the bronchi where aspiration of fluids is desired over protracted periods.

This instrument is 53 c.m. in length, on all, by 3½ m.m. in diameter. Made flexible by winding copper or German silver wire and hammering to obliterate the interspaces due to winding. The *end,* which is inserted into the trachea and bronchia terminates, with lateral eyelets and one at the end, which is rounded to prevent trauma during insertion. The part protruding from the patient's mouth, after insertion, terminates in a solid tube which is held in position



by a head strap. This part of the tube is then attached to the ordinary suction machine which develops approximately ten pounds negative pressure. During use the patient's jaws are separated with the ordinary bite block used in bronchoscopic work. The instrument is made either rubber covered of 3 m.m. diameter or without the rubber sheath with a 3½ m.m. diameter.

It can be inserted with or without a stiffening stilette, using the Jackson laryngoscope to open the glottis or where it is desired that it be placed in a definite bronchus to drain a particular part of the lung, it can be inserted through the Jackson bronchoscope. If used in the latter way, the addition of 25 c.m. of fairly stiff rubber tubing to the aspirator at the proximal end will allow the withdrawal of the bronchoscope without displacing the tube.

From the Bronchoscopic Clinic, Jefferson Hospital.

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THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

Regular Meeting, February 13, 1925.

Paper: **Some Clinical Remarks on Modified Radical Mastoidectomy for Chronic Purulent Otitis Media as Practiced by the Author.** Dr. Hugh B. Blackwell.

DISCUSSION.

Dr. Alfred Kahn said that when he first heard Dr. Blackwell's discussion of this operation some years ago he was very much opposed to it, as were the majority of otologists at that time. Indeed at a meeting of an Otological Section at about that period he was very seriously attacked on the subject. Today, however, Dr. Kahn said he was of a very different opinion, for he had had more experience and felt that the operation had a definite field, though he did not agree with Dr. Blackwell as to what were the indications for it. For example, in certain cases it is difficult to decide beforehand just what form of operative procedure would be indicated. In a recent case at the New York Eye and Ear Infirmary a patient had a large posterior opening following a mastoid operation in which it was impossible to get the wound to heal. Two operations were done; finally the wound was opened and a modified radical operation done; then a skingraft was put in (probably the first skingraft ever done in conjunction with an operation of this type). The posterior wound was left open until the new skin adhered. The usual procedure of simply drawing the flaps of the wound together was not used because there was not sufficient tissue to make closure. By doing the modified radical procedure we were able to secure sufficient tissue to close the wound. Here we have an indication for the modified radical procedure.

As to the insurance statistics, Dr. Kahn said that judging from his experience he felt that the insurance companies are unfair to assume that these cases should be rated at ten to fifteen years beyond their age; he did not believe statistics would support that.

To his mind the indications for the operation would depend largely on the condition in the middle ear. If the middle ear is without necrosis and the drum intact, it would seem that this operation might be done, but if you are not sure about middle ear necrosis, the modified operation would be doubtful. Speaking of discharge from a chronic ear, the correctness of the term chronic mastoiditis would depend on the condition; if there is a discharge from the middle ear simply, one would not be justified, from that alone, in saying that there was a chronic mastoiditis. On the other hand, if you have a perforated drum, and the bones of the middle ear are necrotic, or partly destroyed, or even if the bones are healthy and there is a perforated drum with a discharge from the middle ear, he could not see the reason for this form of operation; he could not see what would be gained.

About curetting the Eustachian tube; the tube cannot be attacked through a modified radical opening. Through a radical opening it can be readily scraped. Quite true, it may not close off; however, many of them do and therefore it is worth while trying. Skin grafting is also an aid in closing off the tube. He did not think skingrafting was appreciated as much as it should be.

Dr. Blackwell's technique was ideal; it is a beautiful piece of work and only one criticism might be made, that is the cutting of the temporal muscle; probably the operation could be done without doing that.

Dr. H. M. Scheer said that during the last year the doctors on the service of Dr. John R. Page at the Manhattan Eye and Ear Hospital

had become enthusiastic on the subject of Dr. Blackwell's modified radical because Dr. Page himself was a close adherent for it in indicated cases. Eight or ten of these operations had been performed in the last year, and the results were such as to confirm the impression that there is a certain indication for it, namely, a chronic otorrhea which has been treated over a period of three to five months; thoroughly treated, locally; and intranasally, through the nose and nasopharynx, all pathology in these parts removed or corrected. If after such treatment the chronic otorrhea persists, and if the drum is partially present—for one cannot have a chronic otorrhea without a perforation in the drum—so if the drum is not entirely destroyed, and if the hearing is fair, and if the middle ear has a fairly normal appearance, even if a small amount of granuloma is present, or even if the handle of the malleus is partially gone, in that type of case the modified radical operation has been done, and we have seen it followed by a dry ear within eight to twelve weeks. The indication of a partially present drum is quite important, for the reason that when the modified radical operation is performed, Dr. Page and others have seen that the drum is regenerated, so much so that where there was only a rim of drum remaining the entire drum has regenerated, and not alone did the discharge stop, but there was a normal appearing drum, with the big cavity following the plastic closure well filled in, except for the large meatus, well dried, and no discharge.

On the other hand, it has been found that where the drum is entirely absent, the ossicles practically gone, the middle ear looking very badly, filled with cholesteotoma or polypi; and the hearing quite bad, so that the radical operation cannot do any more harm to the hearing, the radical operation is the procedure in preference to the modified one.

Dr. Scheer said that in the last few weeks he had operated on a child of seven with a big perforation that showed the handle of the malleus gone, and a big polyp, profuse odoriferous discharge, etc., at the time of operation. This operation was done, and in three weeks the upper part of the cavity was drying up; the discharge was not one-tenth of what it was previous to the operation, and the middle ear began to look cleaner and more healthy. These experiences have led him to feel that otologists should employ this operation more than they have been doing, and should make it an intermediary step before doing a radical operation unless the radical operation is absolutely indicated. Dr. Page advises doing this operation and taking the chance of getting good hearing, and then if it does not result properly there is time to do the extensive radical mastoid operation.

Dr. Maybaum said that he feels that the real advance in aural surgical technique during the past twenty-five years has been not along lines of conservation but of thoroughness in operative procedures whether applied to the simple or radical mastoid operation. One of the objections to the modified radical operation is the likelihood that it may be employed frequently without clear and definite indications, including in its scope all types of chronic discharging ears. For a case of chronic middle ear suppuration with actual or threatened complication a thorough radical mastoid operation must be done. The presence of a cholesteatoma is a clear indication for a complete radical operation; in these cases it is necessary to thoroughly inspect the meato-mastoid cavity; the condition of the bony labyrinth, the presence of an erosion of the tegmen tympani or necrosis elsewhere in the middle ear must be brought to view through a wide open cavity and any half-way measure will not answer the purpose.

Undoubtedly there must be a comparatively small group of cases for which a modified radical operation such as Dr. Blackwell describes, is indicated. A complete simple mastoidectomy might answer in such cases. One is apt to become over enthusiastic regarding an operation of this type and to carry the indications for operation along these lines to cases which might with a little more patience respond to local treatment.

Dr. Blackwell is to be congratulated upon the results obtained in the cases which he has presented. Dr. Maybaum believed that Dr. Blackwell should be clearer in stating the indications and contra-indications for the modified radical. He stated that the important fact regarding the operation is the retention of good hearing. The question of the change in hearing after a radical mastoid operation depends upon a number of factors. In some cases the hearing is improved, while in others it is made worse. A good deal depends upon the degree of hearing before operation, and upon the care with which the after-treatment is followed. Healing results depend upon the operative technique, ability to close tube, etc. Proper packing of the tympanic cavity is important. It is not necessary to carry the packing back into the mastoid cavity, the latter is allowed to fill up with granulation tissue, the packing being firmly introduced to the inner tympanic wall and a short distance back.

In closing, Dr. Maybaum said that he had not done any of the modified radical operations, as the cases requiring such an operation had not presented themselves to him. He was, however, much interested in the results obtained by Dr. Blackwell.

Dr. Sautter thought that Dr. Blackwell's paper was most convincing, especially after seeing the pictures and remembering the cases he has demonstrated, but could not altogether agree with what had been said. From the observation of modified radical cases which he has seen in the past, the results are very good; but from his own experience in surgical work on chronic mastoiditis he questions the selection of the cases just shown. Recently he had seen two cases, one of them operated upon by the most devoted and enthusiastic exponents of the modified radical method and the other by a prominent continental surgeon, and in both instances the ear was still discharging and the hearing was not any better than in any other case operated upon by the radical technique. Dr. Sautter said he had not himself operated on many of these cases by the modified radical method, but judged from his own experience in the surgery of chronic suppuration. Everyone knows of the progress of the modern technique, including that known as Dr. Blackwell's method, which has been wonderfully developed in the last fourteen years; he has made it more complete and has gained better results. It is the same with the radical mastoid operation. We have learned to do it better and to keep down the granulations, and to use the skingraft; in this way better results are accomplished and good hearing is obtained. The radical mastoid, however, must be followed up after operation; it must be observed and treated three or four times a year on the average and kept clear from cerumen. In that way the tissues are safeguarded and the condition of the hearing is much better. One can place a plug in the radical cavity and get improved hearing.

Dr. Sautter said he had tested out some of these cases presented by Dr. Blackwell and found that the hearing was practically the same as in his own radical cases and some others he has seen.

Dr. Blackwell had mentioned the reluctance of many men to do the radical operation. Many physicians and even many aural surgeons are rather provincial when it comes to real knowledge of what the radical mastoid operation will do. How many cases of facial paralysis are seen today after the radical mastoid operation? One great advance has been made in regard to the packing. One should be very careful about the packings, and they should be taken out after twenty-four hours whenever there has been an exposure of the facial nerve and give the ear a chance for aeration, and eventually the case will clear up with no facial neuritis.

I remember several of my cases in which it would have been impossible to have performed a modified radical because of an inaccessible mastoid antrum, due to a far forward sinus, so that to eradicate the disease it was necessary to take down the posterior wall through the tympanic cavity. Other cases in which there were extradural abscesses had to be drained from the middle fossa in the area adjacent to the tympanum. A modified radical could not accomplish this purpose.

Dr. Sautter closed by saying that in his opinion the modified radical operation seems to be a compromise, and that in those cases which show improvement the same thing would be accomplished by a simple mastoid operation.

Dr. J. J. Gurtov said anyone who has done the modified radical operation or has seen some of its results must admit that this operation so admirably illustrated tonight by Dr. Blackwell supplies a necessary want between the simple mastoid and the radical operation. There are many cases of chronic otorrhea for which the simple mastoid operation will not suffice, and while they have not reached the stage for which the radical is indicated, such as extensive cholesteotoma, granulations or polyps in the middle ear, if the modified radical is done early a large number of such patients would be relieved of their condition and saved from the ultimate necessity of a radical operation.

There are some points, however, which may not be amiss to discuss in detail. Dr. Blackwell referred to the continuation of the discharge after the radical operation. This may occur also after the modified radical. One of the most frequent causes of this condition is the non-closure of the Eustachian tube. Another cause which has been pointed out by Dr. John R. Page is the condition of the mastoid bone. An apparently healthy bone may contain necrotic cells within it, and interfere with the healing process. Instead, therefore, of removing only a narrow strip of cortex as practiced by most surgeons, Dr. Page advises complete exenteration of the mastoid in all forms of radical and modified radical operations.

Dr. Blackwell suggests the removal of the epitympanic ring as a routine procedure. This rule is not followed by some surgeons. Dr. Page is guided by conditions found. He takes off the ring if conditions in the tympanum calls for it. However, not only does he leave the ring when it is in a healthy condition, but even if granulations cover the area of the ossicles and ring and after clearing these away the ring is found to be little damaged, he sometimes prefers not to remove it.

Dr. Maybaum suggests the radical operation in all cases of cholesteatoma. In Dr. Page's clinic some cases with extensive cholesteatoma have had the modified radical done with fairly good results.

Given any case of chronic otorrhea it is not possible to determine in advance which form of operation is indicated. Even cases with comparatively small perforations in the drum may contain sufficient changes in the middle ear to make the radical necessary. It is not until the mastoid is opened and the destructive changes found not to extend into the tympanum that the modified radical is the choice par excellence.

Taking it all in all, there is a large number of cases of chronic otorrhea where the modified radical can easily replace the radical operation. Particularly in children and young adults the modified radical obtains wonderful results, with better prospects of preserving the hearing than can be expected in the complete radical operation.

Dr. Clarence H. Smith said he had never done Dr. Blackwell's operation, but it sounded very attractive. Recently he had had the opportunity of seeing Dr. Heath in London do some mastoids after his modified technique. The difference between the Heath operation and the Blackwell operation is that Dr. Heath leaves a part of the bony ridge external to the aditus, claiming that it is impossible to keep the drum in place unless that support is left. This prevents one from cleaning out the attic as in the Blackwell operation. Heath is very enthusiastic about his operation and uses it in cases of simple mastoiditis as well as in many cases of subacute and chronic purulent otitis. He recognizes, however, that there is a need for the radical mastoid and occasionally uses that, but his own operation is the one he usually employs. The great point in the modified radical operation, as in the Heath operation, is the preservation of the hearing, and it stands to reason that in the Blackwell operation where you leave the remaining portion of the drum untouched, and the ossicles, you get better hearing than if you take out the ossicles, as in the radical operation. There is a very marked difference in the hearing, and that is an important object.

Dr. Smith said he was glad to see the cases shown by Dr. Blackwell, and to see that Dr. Blackwell was able to keep the drum in place after taking down the bony ridge, and when he has a suitable opportunity he will try this modified radical operation.

Dr. Blackwell said that the mortality statistics in his paper relating to the number of deaths due to ear disease had been taken from the Census Bureau reports for the years 1911 to 1921, inclusive, and were based upon the returns of thirty-five states only. For 1921, which was the last year available, there were some 2800 cases in which the deaths were attributed to ear disease. There were also many more that year who died from meningitis. It is of course a question whether in some instances the ear cases have been falsely grouped under this diagnosis.

Dr. Blackwell said that the policy of the insurance companies is largely based upon the reports of the actuaries employed by them, whose business is to look into the various causes of death and calculate the percentage of risks for the various ages in different diseases. The companies are naturally in business to make money and their policy with regards to patients suffering from chronic otorrhea is based upon the life risk to the patient so afflicted. As I have stated before, great many companies refuse to accept such individuals on any basis and those who do only accept such individuals at a greatly advanced rate of interest, as regards the suggestion that insurance men consult with otologists before deciding what disposition to make of a particular case of O.M.P.C. Dr. Blackwell said that he failed to see how such a consultation would be of much assistance to the company, as their policy is necessarily based not upon individual cases but what actually is the incidence of death in a large number of cases of chronic otorrhea, a question which the average otologist is not qualified to answer. We have also been asked how it is possible for a patient in which there is a necrosis located in the middle ear or ossicles to be benefitted by the operation which we have described. We would like to ask how does one diagnose necrosis in this region and what is its significance? A great many of our cases presented large marginal perforations with bare bone in the tympanum, yet were very successfully operated upon with good results. His own experience, based upon some sixty-odd modified radical operations, is that when one drains and permanently aerates the antrum region as shown and illustrated in the modified radical operation here described that cases of supposed middle ear necrosis will recover and become dry; he is convinced that the cause of chronic otorrhea in the vast majority of cases lies not in the middle ear, but in the antrum itself and when this region is once permanently aerated and drained the middle ear either completely recovers or greatly improves, no matter what its condition may have been prior to operation.

In regard to the indications for performing a modified radical operation Dr. Blackwell said he would consider the procedure in all cases of chronic ottorhea occurring particularly in young people, especially in those cases where the hearing was good and which had resisted treatment for a period of two or three months. He did not feel that the presence of cholesteatoma should constitute a contra-indication, as in most of the cases he had operated upon cholesteatoma was found and he had never been able to observe that the post-operative course of these patients differed materially from others in which no cholesteatoma was present.

In regard to the hearing following a modified radical, Dr. Blackwell said he was convinced that in the average case it is much better than it would be were a radical performed, and while this may not be true as concerns one or possibly two of the cases presented this evening, yet he feels confident that the other ten or eleven bear out this contention and he called upon the members of the Section to witness this fact.

Three of the cases presented tonight were those in which double modified radicals were performed over six years ago and for a number of years have been engaged in earning their livelihoods in vocations, *e. g.*, private secretaries, salesmen, etc. He would like to ask the

members of the Section if they knew of any instances where double radical operations had been performed and the patient subsequently able to earn his livelihood in similar vocations where acute hearing was so essential.

It rarely occurs that an otologist performs a double radical operation. It is so unusual to do so that the author does not recall at the moment an instance of this kind. Surely this reluctance on the part of otologists to perform a double radical does not lie in the scarcity of cases of double O.M.P.C., but rather in the fear justly held of causing subsequently great loss of hearing. In none of the cases of double modified radical which the author has performed has this followed; on the contrary, the patients have all felt that subsequent to the operation the hearing was improved.

He believes that otologists should consider as chronic mastoiditis cases of O.M.P.C. which resist treatment over a period of two or three months if there is an odorous discharge present. Observed from this standpoint the logical procedure to preserve the hearing would be to perform a modified radical operation, as by so doing we remove the focus of disease, namely, the antrum, and at the same time preserve the middle ear structures essential to hearing.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

February 26, 1925.

Rhinological Phases of Asthma. Dr. Burton Haseltine.

The conception of asthma: the clinical phenomenon known as bronchospasm, consists essentially of a spasm of the musculature of the small bronchioles. Accepting this definition, in its essential designation a spasm is an exaggeration, prolongation, or other modification of a normal reflex. This means that it is primarily an affair of the nervous system and is functional rather than structural in its inception. This point is of the utmost importance, as it means that a functional disturbance precedes any structural change; hence, all examination of any pathological tissue, ante- or post-mortem, is the study of a result, not a cause.

If a spasm is the result of a normal reflex, then the structures necessary for its production are the same as for the production of the reflex, namely, a peripheral sensory organ, an afferent nerve, a central nucleus or nuclei, an efferent nerve, and an end-organ, such as a muscle fibre, in which the final result is manifested. It must be remembered that the sensory receiving structure is often anatomically remote from the muscle or other organ in which the final result is shown.

The conditions which may produce this exaggeration of a normal reflex or spasm are: 1, the acute or chronic exposure of the central nervous system to the action of a poison (toxin); this poison may be exogenous or endogenous, single or multiple, bacterial or non-bacterial; 2, an abnormally irritable peripheral sensory organ. In the particular spasm known as an attack of bronchial asthma, the two producing factors are: 1, a highly toxic condition, chronic in nature, vaguely recognized under various names, but present in all cases; 2, an abnormally irritable peripheral sensory organ, which in this case is the ethmoid area of the nose.

For a clear understanding of this concept, one must distinguish between the term asthma and bronchospasm. Asthma is neither a symptom nor a disease, but is an abnormal bodily state manifested by various symptoms, such as urticaria, eczemas, eosinophilia, cyclic vomiting, protein or non-protein sensitization, disturbed calcium or endocrine metabolism, hyperesthetic rhinitis, angio-neurotic edema, acidemia, mucous membrane hyperesthesia (hay-fever), to which may or may not be added bronchospasm, which is now recognized as only the climax to

a rather definite sequence of abnormal manifestations. It occurs only when general toxicity reaches a certain stage and when ethmoid irrigation becomes sufficient to incite the spasm. The asthmatic patient is in a constant state of delicate balance between absorption and elimination; anything that helps to throw the balance the right way will relieve him; anything throwing it the wrong way will increase his distress. The asthmatic patient has an abnormal ethmoid; anything that lessens ethmoid pathology will relieve him; anything that increases ethmoid pathology will increase his distress.

The reflex arc which makes this spasm possible is formed by the connection between the trigeminal sensory nucleus and the nucleus ambiguus and the norsal nucleus of the ascending vagus root. This reference to any text-book on the anatomy of the central nervous system. It is through this arc that is produced the sneeze or cough from irritation of the ethmoid, and it is probable that by this same mechanism is produced the wave of contraction that has been shown to occur on normal respiration. These reflexes appear to be the physiological analogue of the bronchospasm. It is not an accident that the rhinologist has gone farther than the pathologist in the solution of this problem. By a combination of circumstances readily understood, it is a clinical fact that the ethmoid labyrinth may be and frequently is both the source of toxic absorption (or one of its sources) and the exciting end organ. The importance of the rhinologist's role in asthma is thus apparent and it becomes clearly defined. This is a distinctly new and highly significant addition to our knowledge of the subject.

The author then discusses in detail the various phases of the toxic state and of the rhinological phases of asthma, emphasizes the value of the Dowling method of treating nasal infections, which differs from all others in that it is not a surface treatment, and explains wherein his own practice differs slightly from that of Dowling. He summarizes the whole subject by stating that those cases of ethmoid disease with retention of discharges, swelling and edema from blocking of natural drainage where not extensive tissue changes within the cells is present, are curable by whatever surgery will unblock the natural drainage, followed by Dowling treatments, with no opening of the cells whatever. It is chiefly in cases of this type that partial operations are reported as successful. Cases of extensive necrotic or polypoid changes within the labyrinth are not amenable to any extra-ethmoid procedure, and any operation short of complete exenteration is almost certain to end in disappointment.

DISCUSSION.

Dr. J. Ivimey Dowling: The rhinological phases of asthma have always been considered important, but it has been left for the essayist of the evening to present the most likely explanation which seems to be borne out by results obtained through the treatment and methods Haseltine advises.

The discussion of asthma is a broad subject and the nasal element is only one of several items recognized by Haseltine to be considered in the treatment, however, it seems to be proven that there can be no without ethmoid pathology.

Haseltine has stated in axiomatic manner two facts necessary to comprehend and accept before anyone can hope to treat asthma successfully.

The primary axiom is "The fundamental basis of our conception (Haseltine and LaForge) is that asthma is dependent upon two factors, toxemia and ethmoid irritation, the first of which is unrelated to the nose."

The second axiom is exclusive of thoracic pathology. "Asthma is curable in direct proportion to the completeness and permanency with which one can accomplish two things, remove all sources of toxic absorption and restore normal physiology."

To those of us who have witnessed results in the treatment of asthma after the manner directed by Haseltine and LaForge it is easy for us to believe that no true normal physiology can exist in the presence of

infected ethmoids. Therefore, it is essential to follow some general method that will overcome and control the effect of ethmoid infections.

The methods resolve themselves into surgical procedures and medical treatment directed to the ethmoid area.

To study the living pathology of the ethmoid area I now resort to an *exploratory submucous resection*, irrespective of the nature of the septum, be it straight, deflected or merely ridged, providing that the middle and superior meati are obstructed by narrow nasal chambers or because of large cystic turbinated bodies.

A high submucous resection having been performed, it then is possible to push the flaccid septum to one side, thereby permitting study of the turbinated bodies and the cells beneath the scrolls.

The living ethmoid pathology may be divided into three classes: first, ethmoid bodies about equal in size, but anteriorly cystic and beneath these scrolls irregularly ridged cells from which oozes jelly-like mucus.

Second, high deflection to right or left, large cystic turbinated body on the one side and flat turbinated body on the other side, both bodies being easily infracted and readily pushed aside, permitting study of the ethmoid labyrinth beneath. In this type also jelly-like mucus oozes on displacement of the turbinated bodies.

The third type is in the extremely narrow nose with fairly straight septum beneath which will be found thin turbinated bodies adherent to the ethmoid cells beneath. In this type also will be observed the jelly-like mucus.

The aforesaid statements are true of the hyperplastic type of diseases in which the patients will usually state that they have never suffered with nasal catarrh. It is these types of ethmoid pathology that I have found are generally overlooked *and they cannot be satisfactorily recognized nor studied without a high exploratory submucous resection.*

My further surgical procedure in these types is to perform complete middle turbinectomies on both sides, either with aid of scissors and snare or the modified Ballenger angled knife, then make a single bite into each bulla cell and a single bite in some posterior ethmoid cell. Subsequently after a period of two or three months the underlying ethmoid cells will have enlarged until it is sometimes difficult to determine just how much erectile tissue and mucous membrane has been removed.

The progressive ethmoid pathology having been controlled, further ethmoid surgery may be instituted if necessary.

The remedial method of treating ethmoid diseases is best accomplished by the method now known as the Dowling treatment. I believe this after many years of clinical research and successful accomplishments, many accept this as true; more will, as they become familiar with the method.

Repetition would weary you and so a single instance will suffice: I therefore present the following notes, with permission. Miss E., age 60 years; "in the spring of 1895, in Washington, D. C., I was sick in bed for a few days with a heavy cold. A sharp pain was felt over the right eye, an abscess developed and finally broke, discharging through the nostril. I was sent North for the summer and told to spend half the time by the sea and half in the mountains. I felt better and stayed North permanently. For two or three years after this I felt a "spot" where the abscess had been. Soon after this the night air, moisture in the air during the day, talking in the outdoor air, laughing even in a dry warm room, would immediately produce asthma. For several years I would sleep for two or three hours each night, then regularly an attack of asthma would come on and I would be obliged to sit in a chair for an hour or more and found relief inhaling the smoke from steamonium leaves and saltpetre.

During this time a physician swabbed my throat and nose once a week; this gave temporary relief, but did no permanent good. About four years ago I was given argyrol packs in both nostrils. The coughing in the street from moisture in the air and the attacks of asthma in the night stopped immediately."

In closing let me emphasize the best results in chronic cases can only be obtained by hospitalization over a period of weeks or months. The rhinologist must co-operate with the internist and sometimes success is only obtained after aid given by the general surgeon.

DISCUSSION.

DR. REGINALD BURBANK (by invitation) confined his remarks to the purely bacteriological aspect of the subject. He said that he had not personally treated a large series of these cases, only about fifty all told, and many of them were chronic infective arthritis with associated asthmatic symptoms. The association of bronchial asthma with arthritis he had found mentioned first by Rolando in 1603, and subsequently by numerous other clinicians before the nineteenth century. In the work Dr. Burbank has been doing, asthmatic cases have been studied chiefly by cultural methods and by active serum complement fixation tests. The cultures are taken from the sinuses, the tonsils and from the sputum. It is his belief that the chest itself becomes a focus of infection in such cases and the preponderant organisms found were streptococcus hemolyticus and staphylococcus aureus. Streptococcus viridans were present in a certain number of cases, but do not seem to be the main causative factor in the production of infective asthmatic conditions. These cultural results were checked by control complement fixation tests and streptococcus hemolyticus and staphylococcus aureus deviations agreed in each case with the cultural findings.

Dr. Haseltine's results are brought about by the right methods from the bacteriological point of view for it seems more than probable that all infections are primarily allowed to gain headway in the body by a lowered resistance and a toxic condition as the basis of the lack of immunity. The surest way to clear up any infective condition is to build the patient's resistance up by eliminating toxic products and providing for a quick and thorough elimination of waste.

Dr. Burbank said that he had worked on this subject purely from the basis of infection and used vaccines as a treatment. Some of the cases cleared up with very few injections others, those with low vitality, were slow in response and a few cases did not improve at all. One case which had been of twenty years duration and had had all types of treatment previously cleared up entirely under vaccine of autogenous and complement-fixing strains and has had no attacks for the past seven years. In this case two series of injections were given. The first series was made from a staphylococcus viridans a rather unusual organism that grows like a streptococcus viridans on a blood plate, but at the end of thirty-six hours the blood plate is cleanly hemolized. Under the microscope it is a staphylococcus. The second series was made from the streptococcus hemolyticus and staphylococcus aureus.

The urine examination of these cases is important for it is very rare to find one of these asthmatics without increased putrefactive products in the urine. There are certain cases that will clear up on improving the patient's general condition, eliminating waste products and preventing an accumulation of "clinkers". Other cases would not improve until anti-bodies were formed capable of taking care of the bacterial invaders and some few would not improve under any method he had tried. Not being a rhinologist he had no personal experience with the colloidal silver applications as bacteriacidal agents for the sinuses, but he felt that vaccine treatment properly administered would be a useful adjunct.

DR. WILLIAM S. THOMAS said that Dr. Haseltine had brought with him a refreshing breeze from our sister city on the lake, and if his championship of the Dowling tampon treatment of asthma proved successful he would be hailed as a public benefactor. In the asthma work at St. Luke's Hospital, they leaned heavily on the rhinologist and doubtless, as time passed, more cases would be treated with the Dowling tampons.

Dr. Haseltine had said that every asthmatic case is a rhinologic case and that no case can be cured without the rhinologist's aid. That, however, seemed to Dr. Thomas to be an extreme statement. At St. Luke's

Hospital a great many patients had been successfully treated for asthma without any rhinological measures beyond examination. Dr. Haseltine cited as one evidence of the rhinologic etiology of asthma, the fact that attacks of bronchospasm are readily relieved by nasal sprays of cocain. It should not be forgotten that cocain was central in its effect and would have the same effect if taken by mouth, or by rectum or bronchial insufflation.

Dr. Thomas said that a detailed statement of Dr. Haseltine's results of treatment of asthma was to be desired, and it was hoped that he would publish them—good and bad together.

Many specialists classify asthmatics into sensitive and non-sensitive cases, according to the results of their protein skin tests, but Dr. Thomas held that all asthmatic patients were sensitive to something or other. If it was not to air-borne substances such as animal danders or pollens, or to foods or drugs, then the patients would be found, when properly tested, to be sensitive to the proteins of those bacteria that they harbored in their bodies. Dr. Thomas' cases of bacterial asthma were treated by autogenous vaccines, administered according to the results of skin tests with those very same vaccines. When the skin reactions were positive, the vaccines that caused the said positive reactions were used for hypodermic treatment in properly graduated doses, with results that would be stated in a few moments by Dr. Touart.

There was a class of asthmatic seizures, continued Dr. Thomas, that seemed to be far away from the hard and fast classification of Dr. Haseltine. These were the so-called non-specific attacks. These are the cases that follow a violent fit of laughter, or chilling of the body surface, or emotional stress such as anger or fear. Every physician has seen such patients; they need not be toxic nor rhinologic in origin. Again, take the case of Mrs. B. and her daughter, two healthy, buxom women, both sensitive to horse hair and suffering from asthma on approaching a horse. After desensitizing treatment last spring, they both went to a western ranch and rode horseback all summer without any asthmatic symptoms. Their treatment was not rhinologic nor is there evidence of their being toxic.

Focal infections constitute one of the serious problems of those who attempt to treat asthmatic patients. Not only may the focus of infection be in the ethmoid cells, but, as is well known, it may also exist in the other paranasal sinuses, in infected tooth-roots, in the prostate, gall-bladder, intestines, tonsils and in the bronchial tubes themselves. Before treatment of these infected cases can be successful, there must first be free drainage established. Then autogenous vaccine treatment, properly conducted, offers a high percentage of cases relieved. About a year ago, on this spot, New York's most eminent asthma specialist made the statement that until some method was found to enable us to treat successfully infected cases of asthma (that is, the bacterial cases) successfully, we were wandering in the dark. A long step in treating these infected cases has been taken by treating them with autogenous vaccines according to the skin test indications and after surgical drainage, if needed.

After all was said and done, Dr. Thomas felt that the rhinologic aspect of asthma was but one of its many aspects. But inasmuch as Dr. Haseltine had made progress in clearing up certain of the causative infections, hearty thanks were due to him.

Dr. M. de M. Touart said that for a number of years he had been greatly interested in the subject of asthma and had tried many methods, finding that no set method existed to govern the individual case. He quite agreed with the Doctor's statement that the toxic load must be diminished before one can use the method with success, and any internist treating any chronic cases would have to admit the same thing. Before one can use any specific measure, the ground must be prepared.

There were several questions in regard to the reflex arc that works between the nose and the bronchial tubes on which he would like some enlightenment from Dr. Haseltine. As he understood it, the Doctor's

conception was that there is an irritable centre, irritated by toxins and an irritable peripheral end organ, such as the ethmoid cells, and that because of these two conditions we have asthma. Is it not possible that the visceral end of the arc might also be the excessively irritable portion? It has been clearly demonstrated that in sensitized animals the smooth muscle tissue throughout the body is in a state of excessive sensibility; it will contract excessively in response to contact with the protein or other substances to which it is sensitized. Consequently, in the sensitized individual the bronchial musculature is excessively irritable and will therefore react excessively to a normal impulse traveling over this reflex arc. Therefore, are there not two sides to this reflex arc question?

Dr. Touart said he had seen a considerable number of asthmatics without ethmoid pathology. He had seen a number of infants with most violent asthma and no nasal pathology, who had been entirely relieved by the removal of the cause, which in their cases was almost always in the food. Not only were they relieved of the asthma, but they were well otherwise. Therefore it would be very interesting to know whether Dr. Haseltine did not think it possible for an asthmatic to have asthma without such pathology; might not the cause lie in the irritability of the visceral end rather than in the other, and might not that be due to the sensitivity to protein or other foreign substances? Also, it seemed to him that there are many patients with ethmoid pathology who have no asthma, who have the two essential conditions, the diseased ethmoid and the toxic conditions, but no asthma. Why does not the arc work in that patient?

All who are engaged in the treatment of these chronic cases ought to be careful not to take extreme opinions, but to take a position near the centre where they can get the best out of both sides and use it to the best advantage. The results from the cases treated at St. Luke's Hospital, published in the Archives of Internal Medicine in July, 1924, showed 62 cases treated with autogenous vaccines. They were selected, in that they had not been helped by other methods of treatment, and in the hospital were not treated other than by means of these vaccines. Out of 62 cases, 32 were completely relieved, and 14 cases were practically relieved; in other words, 74 per cent of good results. After two and a half years of this clinic, 97 cases have been treated in this manner: 23 of them have remained practically well for one to six months; 21, 6 to 12 months; 20, 1 to 2 years; 4, 2 years or over.

Dr. Touart said it might appear rather ungracious to seem to attack Dr. Haseltine's subject, but after working on this question for many years he did not like to give up the idea of sensitization being a very important factor in asthma.

Dr. John McCoy said that the subject had been pretty well covered and reviewed by the various speakers. Dr. Haseltine had been kind enough to give him opportunity to familiarize himself with the substance of the paper and to look up these apparently revolutionary ideas in regard to asthma, the revolutionary part of it being due to the claim that asthma was always due to ethmoid pathology, and being occasioned by a reflex arc going from the 5th to the 9th and 10th nerves. Dr. McCoy said he had taken occasion to look up these nerve perambulations himself and also in connection with a neurologist, but they had been unable to find any connection between the 5th and the 9th and the vagus nerves, etc.

The members of the Section were greatly indebted to Dr. Haseltine for bringing forward this subject of detoxication. He thinks the specialist is more likely to think of detoxicating a patient than the general practitioner. It has come in a general way to be known that the rhinologist can relieve asthma, and Dr. Haseltine scored a strong point when he said that one should never forget the importance of eliminating the foci of infection. In one extreme case where the patient was developing colds all the time, he was finally relieved of a fistula in ano and immediately his colds ceased. Dr. Haseltine assumed two indispensable

elements: one of them, ethmoid pathology; and the other, toxemia. If one or the other fails, his theory would seem to fall down.

In going over the cases treated, Dr. McCoy has met such types as these: those that have a nasal condition only; he has operated on cases with frontal sinus and ethmoid disease, with absolute relief to the patient; and he has operated on antra with absolute relief, so that it would seem that in nasal types such treatment is most hopeful. He has also operated on nasal types with indications of intoxication. In one instance a radical operation was performed on both sides and the patient's nose trouble cleared up completely, and apparently his asthma also disappeared, but at the end of nine months he returned, stating that his asthma was as bad as ever. An internist then treated him an relieved the toxicity, but it came back, etc. Dr. McCoy said that such experiences made him rather question Dr. Haseltine's theory, as did also the cases related by the previous speakers with allergy, where nothing but desensitization seemed to cure the asthma. Other cases he had referred to the medical men, who found a myocarditis, and with rest in bed for a few weeks, and digitalis, they cured the asthma.

It would seem that we are constantly having influences pass from all parts of the body to the vagus and even from the emotional centers. We know how fear will cause the heart to go more rapidly. So that many of these patients are affected other than by the arc of which Dr. Haseltine spoke.

Dr. Haseltine had stressed the Dowling tampon. That is a very valuable method, and has given as good results as any non-surgical method. It has an unquestioned place in our armamentarium.

Dr. Harris A. Houghton said that while Dr. Haseltine did not need any assistance from him in defending the theses which he had presented, the speaker felt that some of those who had discussed the paper were not entirely fair in presenting Dr. Haseltine's position. "I am myself in hearty accord with the main premises, in that he believes that bronchial asthma has a fundament in two distinguishable conditions, *viz.*, allergy and bacterial intoxication. His views fit exactly with my own experiences in studying the chemistry of the blood of asthmatics. Many of them have sufficient degree of nitrogen retention to warrant regarding them as nephritic. This may be accompanied by a considerable degree of myocarditis, or the myocarditis may exist independently without the nephritis. It would be hopeless to try and relieve such patients without appropriate metabolic treatment, or treatment directed towards the damaged myocardium.

"In presenting the blood chemistry examinations of some asthmatics at the November meeting of this Section, I showed that a characteristic of long-standing asthma was a supersalinity of the plasma. The intoxicating substance in this combination is the sodium, and to it may undoubtedly be traced a part of the hypersensibility of the nervous system, which in turn is responsible for the excessive nervous reactions described by Dr. Haseltine as a *sint qua non* of the asthmatic state. There is also excessive bronchial secretion, and a dropsical mucosa of the bronchial tree. This might well be a localized dropsy due to chemical reactions of sodium in the bronchi in exactly the same way that the blood vessels of the legs are rendered permeable to water in well-recognized salt dropsy. Most of these old asthmatics have a moderately high blood pressure. All of these coexisting conditions call for a diet low in sodium chlorid, and in those bases which according to Ambard have the peculiarity of acting as a substitute for sodium in the body chemistry. The diet therefore should be one low in sodium, rather than expressed as a diet low in sodium chlorid.

"About 25 per cent of our old asthmatics have a high blood sugar. Many of these are what we call concealed diabetics, *i. e.*, they have a high blood sugar and no sugar in the urine. The only way to make a diagnosis is to do routine blood chemistry examinations, and no matter what is done to the nose, or with vaccines, or in dieting, there will be many failures in treatment if this incidence of high blood sugar is neglected.

"Outside of the high blood sugars encountered, the deviations from the normal in blood chemistry are due to prolonged irritation of the kidney from focal infections, 90 per cent of which are found in the regions from the neck up. In treating asthma, one can break into the vicious cycle anywhere and get some results. Removal of the infected tonsils will decrease intoxication, relieve strain upon the kidney, and tend to improve ethmoiditis. That may be all that is necessary to do for temporary relief. The same result will follow ethmoid eventeration without removal of the tonsils, and will also reduce the local susceptibility in the ethmoidal region of the nose. Temporary or even permanent relief may follow. The same may be said of draining an infected sphenoid sinus or washing out the antra. One may treat any of these infected conditions without surgery and with vaccines, and get some kind of results other than negative, notwithstanding the fact that it is clearly unscientific. By the use of vaccines, the vicious cycle is broken into.

"'Furthermore, one may vaccinate against foreign protein and attack the allurgical segment of the problem. The vicious cycle is again broken into, and temporary relief may or may not follow. As a metabolist, I may attack the cycle from my point of view, correcting the results of the prolonged infection by diet—and this is purely symptomatic treatment—and also get results, temporary at least. I have done it many, many times. But I would as well think of stopping the asthma by smoking cubebs, as I would to try and cure without the aid of the nose and throat surgeon, who, in old asthmatics will always find pus and plenty of it, above the neck. If you would cure your patient each individual case must be investigated along all of these lines, and must be treated along all lines, and treated very skillfully. In proportion to the skill used and in proportion to the breadth of vision in discovering links in the etiology, in that proportion will the percentage of cures increase, and permanency obtain.

There is no cheap or easy route in curing asthma. The longest and the hardest roadway is the one to follow, and patience is the highest of virtues.

Dr. L. M. Hurd said that one would see several hundred cases of ethmoiditis before he would see one in relation to asthma. He believed that the number of asthma cases due to the nose were in the minority; that most of the cases were due to foreign proteins, either ingested or inhaled, and in those cases in which the nose was a causative factor, he had always found a micro-organism in the nose and that patients were sensitized to it the same as they are to foreign proteins to which they are sensitized, such as pollen, horse dander, etc.

Operation upon the ethmoids will relieve and cure asthma in so much that it affords drainage and gives the patient an opportunity to rid himself of the micro-organisms to which he is sensitized.

Dr. Haseltine spoke of Dr. Adams' book on asthma, published in 1913, which I read in that year and seems to be of the same trend as that in which Dr. Haseltine is now talking.

Dr. N. L. Wilson asked that Dr. Haseltine tell what experiments had been made to show the bactericidal action of argyrol and its osmotic action on mucous membranes. Many of those present who knew Dr. Ballenger would remember the "vicious circle" and his speaking of this same thing some twenty years ago, so there was evidently something in the theory. There was also something in Dr. Dowling's tampons; but in going about and seeing men with patients in their offices waiting with tampons in their noses, it seemed to him that we are getting to be empiricists; treat only the cases that actually need it and leave the others alone.

Dr. Mark J. Gottlieb said he had listened with a great deal of interest to Dr. Haseltine. He had just been looking over some statistics on the subject of the relation of nasal disease to asthma, and in a very carefully selected list of 160 cases where the nose was studied carefully for the presence of disease, he had found that in this series there were

only 31 authentic cases of disease of the nose; so that it would seem that we are either missing something in our observations or there is something wrong in our technique, in observing or considering just what disease in the nose really means, if we assume Dr. Haseltine to be correct.

He did not believe that it was possible for a doctor who is treating asthma to make a definite statement as to the length of time or as to a cure. It is not practicable to observe these cases long enough, or if it is done they may relapse after a number of years. It would be much better to speak of the absence of symptoms for a number of years. Also, no treatment can be stereotyped. Each patient must be considered individually and treated accordingly.

Dr. Joseph Harkavy expressed interest in the various views presented, but asked for further information: 1, as to what was the toxic condition and 2, what the pathological findings of the nose were in the cases of asthma under discussion. He said that in the asthma clinic at Mount Sinai Hospital, where a large number of asthmatics were treated, every case of asthma had a rhinological examination, and many of these were operated on from time to time to eliminate foci of infection which played a possible etiological role in the asthmatic attacks.

He had no wish to minimize the importance of such procedure in those cases who had definite sinus infection, where the evacuation of pus and drainage promptly relieved the asthma. Unfortunately, however, in their experience the majority of the asthma cases who have concomitant nasal symptoms have such as the result of irritative factors operating within their particular environment. It must be borne in mind that a patient with true bronchial asthma may be said to have an "asthmatic constitution", which, although a poor term, expresses the idea that such a person differs from the normal individual because of his peculiar sensitiveness to a multitude of substances that may fall either in the inhalant group, such as dust, pollen, feathers or foods, or bacteria, etc.

The relief or the removal of any one group responsible for a current attack does not necessarily protect him from other new etiologic factors, and that is due to his constitutional makeup.

Still another point should not be forgotten, and that is that a patient with true bronchial asthma may have diabetes, nephritis or tuberculosis, which have nothing to do with his attacks. These are independent states and the blood findings expressive of the first two conditions are not to be attributed to the bronchial asthma.

Dr. Haseltine said the discussion had reassured him on two points about which he had had misgivings: He had doubted whether he could bring to this Section anything new or interesting. The interest had been shown by the very generous discussion, while the newness was evidenced by the polite incredulity expressed. It was highly significant that the incredulity was shown by those to whom the ideas were new, while those who had seen the results of their application expressed only favorable opinion. This has been the unvarying sequence of reactions following the presentation of this subject to numerous medical societies during the past five years.

To those who are satisfied with the results of vaccines, serums, or antigens in the treatment of asthma he had nothing to suggest. To those who are disappointed with these results he suggests a method which seems to meet the problem with much greater success and especially in those cases where vaccines and serums have completely failed. He has here many case reports bearing upon all phases mentioned in the discussion, some reports covering a period of fifteen years, which it would be interesting to read did time permit.

Answering Dr. Touart's question, "Does not the peripheral stimulus for the spasm come from the gastro-intestinal tract?" If so, why is it promptly stopped by cocainization of the nose?

Dr. Thomas has said that cocaine would have the same effect taken by mouth or rectum. This statement is entirely erroneous. More than

that, it is a highly dangerous error. In all operations upon asthmatics special precaution is necessary to prevent cocain from entering the stomach or otherwise reaching the general circulation because the resulting cardiac depression predisposes to an attack and adds a serious complication when it occurs.

Dr. Haseltine was frankly astonished at Dr. McCoy and the so-called neurologist. It is not "revolutionary" to refer to known facts. The connection between the descending trigeminal root and the vagus nuclei is common knowledge. (Edinger, Barker, Ranson, Epplinger and Hess, Gordon Wilson, McClaren Thompson.) The chart here shown is from Ransons' Anatomy of the Nervous System, which describes the connection in detail. It is true that Dr. Haseltine in 1911 first suggested this as the explanation for the nasal reflex, but he did not discover the anatomy nor invent it.

He was grateful to Dr. Gottlieb for mentioning his method of reporting cases. Those who have read his articles will recall that Dr. Haseltine never reports a case as "cured", but gives dates when treatment was terminated and length of time patient remained symptom free.

He thanked the various speaker for their generous discussions and for the many valuable points brought out.

SECTION ON OTOLOGY.

March 13, 1925.

Paper: **Discussion of Clinical Problems of Chronic Suppurative Otitis Media.** Dr. George E. Shambaugh (by invitation).

DISCUSSION.

Dr. John McCoy said that the author whom we like best is the one who expresses our own thoughts better than we can do it, and Dr. Shambaugh had just done that for him. To take up the various points presented would simply be to emphasize them. For seven or eight years he has not himself operated on a deviated septum for the purpose of relieving an ear condition, but only operates on the septum for the relief of nasal obstruction. He did not know that he had ever seen a case of complete atresia with a perfect ear, but no doubt that was possible.

Dr. McCoy said that he, too, like Dr. Shambaugh, had had twenty-five years of experience as a specialist, and he has come to feel that individuals, like societies and nations, have opinions and change them, and perhaps change back again later. His first impression in treating ears was that 99 per cent of chronic ears should be treated conservatively; then, seeing the bad results, he changed his ideas and commenced to think it best to try a moderate degree of conservatism and if that failed to resort to the radical operation; but gradually he formulated in his mind the conclusions which Dr. Shambaugh had so beautifully pointed out regarding bone invading processes. But a number of these cases come very close on the border line and many of them are seen in consultation, and the question comes up whether or not to operate. Dr. McCoy said he sees cases that have been conservatively treated, where the patient comes to him with a facial paralysis; and others that have been treated conservatively yet have established a labyrinthine involvement, and from the number of these that he has seen he is now inclined to the radical side. He balances the question, as Dr. Shambaugh had pointed out, but rather leans toward the radical side and would remove the necrotic bone near the dura; for he has never seen a bad result from a radical operation in such cases, but has seen a number of bad results from neglect to do it. It is certainly up to the profession to consider carefully the points brought out by Dr. Shambaugh.

Dr. McCoy, in conclusion, said that he would differ, however, with Dr. Shambaugh in regard to operating on the labyrinth in cases of acute suppuration of the middle ear. It has been his experience, even though the function is completely gone, not to touch the labyrinth. He said that a large majority of these cases following acute infection of the middle ear, will get well through simple drainage of the ear or mastoid. That was a point on which he differed, if he had understood correctly. He then asked Dr. Shambaugh's opinion in regard to X-ray examination of these chronic mastoids. How much value does he place on them? Also, what is his opinion of the spinal tap; should it, or should it not be done? In his own experience, it makes a great deal of difference in deciding whether or not the labyrinth should be opened.

Dr. Lederman expressed his appreciation of the value of Dr. Shambaugh's address, and said he would like to offer a few observations from his own experience. Referring to the subject of infection of the middle ear, he told of a recent case, a child which was admitted to his service with a condition of nephritis and an acutely involved middle ear. The child had been sent in for operation, and on examination, he decided to simply excise the drum and keep the patient under observation. In his opinion it was a question whether the invasion of the kidneys was secondary, or was concomitant with the condition of the middle ear involvement, and one could not at a single examination decide the facts. The case was watched for two weeks, and although it required the exercise of a good deal of masterly inactivity to keep from operating, it was noted that as the process in the middle ear subsided the kidneys improved, and ultimately the child recovered without a mastoid operation, and the kidneys cleared up. In regard to the hearing: in these cases of chronically diseased ears, all have had the experience of being told by a patient that the hearing was much better when the ear was moist than when it was dry.

The pathognomic symptom of bone invasion, the characteristic odor, is not always an indication that an operation should be performed. In one instance, a professional man had been troubled with a chronic ear for thirty-five years, and was advised by several eminent specialists of this city to have the radical operation done. He was very loath to agree to those, as he could get no opinion as to whether or not he would lose his hearing, and so he decided to follow a conservative line of treatment.

On examination a very large perforation was observed, involving the posterior half of the drum, with polypi in the attic region. These growths were removed and after about two months of regular conservative treatment with a special iodin powder (Salzberger) he got well to such an extent that not only did the suppuration cease but the drum healed over. When first seen, this patient heard the whispered voice at only three feet, but at the end of the treatment he heard the whisper at 12 to 14 feet.

In another case a woman had suffered from a prolonged suppuration of more than thirty years' duration. When examined, the ear was apparently dry but, on removing a scab, pus and cholesteatoma were revealed, involving the inner portion of the auditory meatus and middle ear: The membrana tympani and ossicles were affected. A considerable quantity of cholesteatoma was removed. She had also some labyrinthine symptoms, saying that the floor seemed to be coming up under her, and vertiginous attacks. Under conservative dry treatment with the powder just mentioned, the suppuration has ceased and her vertigo has markedly improved. If ever any cases seemed to demand operation these did, yet in both patients the active suppurative process has been cured without surgical intervention and good hearing has been retained.

In another instance, a young girl, age 15 years, was admitted to the medical service of Lebanon Hospital with the symptoms of high temperature, chills, headache, and nose bleed, and a tentative diagnosis of typhoid fever was made. On routine examination she was found to be

three months pregnant, and immediately associated with this fact was the thought that she had attempted some method of abortion. Further investigation found no sepsis in the uterus or adjacent parts, but one day a foul discharge from the ear was noted, so an otological examination was requested. This resulted in a diagnosis of sinus thrombosis. The patient was operated upon the next morning, and an infected lateral sinus and clot was found. The internal jugular was then ligated. She also had some chest symptoms, cough, etc., and later a lung abscess was found, but the surgeons thought it best not to operate. She aborted on the third day, and after a stormy convalescence with appropriate treatment of the various complications, she got entirely well and was later presented before this Section. Here was a case of chronic suppuration and no history of aural symptoms until the fulminating symptoms pointed to this organ.

Dr. Lederman said he was pleased to hear Dr. Shambaugh speak on the question of conservatism in treatment where both ears are involved. Formerly in cases of bilateral suppuration it was the question which ear should be operated upon, because the hearing was gone on both sides. In one case, that of a small child, the entire drum of one ear had been absorbed and the membrane of the other ear was thickened from previous suppuration, and yet the child heard better on the side where the drum was gone than on the other. Another aurist advised immediate operation lest some cerebral complication should develop. The large perforation was evidence that the drainage was good, and in this case also, under conservative dry treatment with the iodin powder the condition cleared up and the hearing was preserved. The question of hearing is a very important economic factor, said Dr. Lederman, and the older he grows the more conservative he becomes. Of late he has had numerous cases get well with the treatment mentioned carried out regularly and carefully.

He then told of the care of a girl, age 14 years, who had been in a hospital with pneumonia complicated by acute otitis suppurative and mastoid symptoms. Operation was indicated at the time, but owing to a bad heart it could not be attempted. When the case came under his observation three years later, there was a large perforation of the external auditory canal wall from the mastoid cells, which were filled with cholesteatoma and granulations. He advised a radical mastoid, but this the family refused. He therefore cleared it out as well as possible with a ring curette introduced through the spontaneous perforation, and after numerous cleanings of the mastoid cavity plus a course of dry treatment the girl made a good recovery, and up to the present time has had no further symptoms. The hearing has remained quite good. The middle ear, which was also involved and treated at the same time, has remained dry. Dr. Lederman said that he had had the opportunity of seeing this patient recently, six years after the dry treatment, and the ear and mastoid cavity are in good condition.

Dr. Norton Wilson said it was most refreshing to listen to Dr. Shambaugh, for they had known each other for twenty-five or thirty years and the Doctor was not always so conservative as he is now. It is a great advantage to be able to reap the benefit of the experience of a man who has studied his subject for twenty-five years and knows it so thoroughly.

The Doctor had spoken of the mucous membrane of the labyrinth as being more tough and protecting the labyrinth more than the bone, and had also spoken of the cholesteatoma invading the sinus. Is it not the fact that the sinus, too, has some protective elements?

Dr. H. M. Scheer asked the privilege of bringing before the Section, and especially before Dr. Shambaugh, a case now under his observation, stating the method of treatment adopted and asking for approval or criticism.

"The patient happens to be a physician, age 45 years, who called on the phone from Haverstraw on Tuesday evening, saying that he had had a bad cold for two weeks, and had had earache for four days, and

asking what to do to relieve the pain. I suggested that he see an otologist in the vicinity or come to New York to one, and in the meantime gave a prescription to relieve the pain. Not hearing from him the next day, I thought he was better, and later learned that at 5 o'clock that day an otologist looked at the ear, found some inflammation in the middle ear. On Thursday morning, at 2 o'clock, the Doctor's wife called up over the phone, saying that he was very sick, had a temperature of 102,° was dizzy, and was beginning to feel nauseated. I said I suspected something more than an acute middle ear process, and that he should have immediate attention, or that she should bring him to New York in the morning. I saw him about 9 o'clock, and he had a lateral nystagmus to the right and fell to the left, and was greatly nauseated; he had a markedly bulging drum, all signs of labyrinthine involvement complicating an O.M.P.A., etc. I took him to the hospital and opened up the tympanic membrane under ethyl chlorid. The pus welled up, pure pus, filling the speculum. I put him to bed, and am keeping him absolutely quiet.

I take this opportunity of presenting this important case and feel that he will get help from Dr. Shambaugh. One of the men in consultation advised keeping the patient absolutely quiet, under narcotics if necessary, and avoiding all irrigation of the ear, simply drying it out, and if within the next few days the mastoid involvement (for there already were signs of involvement) necessitated interference, to operate on the mastoid and open it up with as little concussion as possible. The hearing is impaired, but not entirely gone.

I present the case for consultation.

Dr. Charles Gluck asked whether Dr. Shambaugh would consider a patient safe for the rest of his life from any intracranial or other complications, when the discharge is relieved and the drum completely dry, the odor gone, and the patient hears the watch tick and whispered voice at 12 to 15 feet?

Dr. Hubby said that he always enjoyed hearing Dr. Shambaugh, for he always learned something from him. Dr. McCoy had touched upon an important point. Two years ago the Section devoted an evening to the discussion of the indications for the labyrinth operation, and the consensus of opinion expressed seemed to be that it was best to leave the labyrinth alone, even when it was functionless, unless the cell count in the spinal fluid was increased; that one should watch the condition of the spinal fluid and if that grew worse to interfere, otherwise not.

Dr. Isidore Friesner said that while undoubtedly the study of the cerebrospinal fluid is of value he does not think that any laboratory test alone should set the indications for operation. Furthermore, with regard to the question at issue between Dr. McCoy and Dr. Shambaugh as to whether a labyrinthitis complicating an acute otitis media should be operated upon, both were right, but were not talking about the same thing. An acute labyrinthitis, complicating acute otitis early usually gets well, but a labyrinthitis complicating a subacute mastoiditis will not get well as a rule. If there has been a mastoiditis with a deep-seated focus eroding the labyrinth, and that is the etiological factor causing the labyrinthitis, that is a very serious condition, for that is undoubtedly a diffuse suppurative labyrinthitis.

It was very gratifying to hear Dr. Shambaugh negative the idea of a clinical differentiation between serous and suppurative labyrinthitis. We have long heard of these two things which are not, strictly speaking, entities. Dr. Friesner said he does not believe that in its essence a serous labyrinthitis differs from a suppurative one. If there occur a moderate invasion of the internal ear, if bacteria cause a reaction in the tissues and fluids of the internal ear, we have learned to call this a serous labyrinthitis. True, there are no bacteria found there, but a great deal more severe invasion with the selfsame bacteria causes a suppurative labyrinthitis in the same way that the serous pleuritis is often a forerunner of a suppurative pleuritis. True, a serous labyrinthitis is often associated with the retention of some function in the

internal ear, but the retention of function does not necessarily mean that a serous labyrinthitis will remain a serous labyrinthitis. He does not believe that the condition can be differentiated clinically, and feels that the use of these terms is a misnomer. Long ago he had advised changing from the terms now in use to a mild as compared with a serious labyrinthitis.

DR. SHAMBAUGH, referring to Dr. Friesner's remarks on the differentiation between serous and suppurative labyrinthitis, said that what he had intended to say was that in these cases of serous labyrinthitis he does not go ahead and operate; if there is a suppurative labyrinthitis, he operates to establish drainage. He does not operate on a mastoid or a labyrinth unless the spinal fluid gives a clue that there is some menacing condition burrowing through.

As to the question of dry treatment, it is a very valuable method, and one should not lose sight of it, but washing out of the ear is not to be discarded for all cases. He could not agree that one should never use irrigation under any circumstances.

Replying to Dr. Scheer's inquiry regarding the physician suffering from an acute attack, Dr. Shambaugh said it is a dangerous thing to have an otitis run on for several days without drainage; that kind of change necessitates an operation; most of them will get well without operation, but where there is a mastoiditis with headache and pain, in many of these cases the drum membrane has not ruptured soon enough, and the patient has not had enough symptoms to send him to the doctor. He felt very strongly that he should leave this patient alone unless he shows signs of intracranial involvement, in which case he would operate quickly, or unless there was a mastoiditis which means that he has a bone disease, which indicates operation. Dr. Shambaugh said he makes a very clear distinction between these two things. Every case of pneumatic mastoid will have acute symptoms.

Dr. Shambaugh said he did not quite get the import of Dr. Gluck's question.

DR. GLUCK said he had had quite a series of these cases in which he gives them a clean nasal cavity and pharynx and the hearing improves, the odor disappears, and the watch tick can be heard at some distance. He had followed this course for some years and had had no complications.

DR. SHAMBAUGH said he would call that a coincidence rather than a fact.

Can one speak of a cholesteatoma breaking through the canal and clearing itself? All have seen such cases, where the patient has a chronic running ear and a big hole running up to the attic, and the appearance shows that a glacier has passed over it; when the glacier has swept over it the air gets in and the process of desquamation begins. Lack of air had increased the moisture. Many patients are seen who have had cholesteatoma who have not required surgical interference, for nature has thrown the space open, the air entered, and the process ceased. The same is true with regard to the carious processes. That does not necessarily mean that there is a dangerous process deeper within, but there may be a deeper-seated dangerous process.

With regard to the X-ray, Dr. Shambaugh said he does not usually get any assistance from it in regard to the diagnosis of chronic suppurative otitis media, but in the case of a running ear which has continued for five or six weeks, an acute otitis media with no mastoid symptoms, and no pain, a skiagraph is very valuable for the purpose of determining the size and location of a possible cavity.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

March 25, 1925.

Paper: **Synergistic Analgesia in Head Surgery with Special Reference to Novocain, Magnesium Sulphate and Morphin.** Dr. James J. King King.

(*Published in full in the March, 1925, issue of* THE LARYNGOSCOPE.)

DISCUSSION.

DR. VOISLAWSKY said he had visited the Hospital for the Ruptured and Crippled and had watched Dr. King's work, and it was most interesting to see his patients wide awake, so to speak, without seeing any injection of novocaine, but knowing that it had been injected beforehand. One of the patients was a great big fellow, and Dr. King very skillfully removed the tonsils and the man never batted an eye. It was a very successful anesthesia.

DR. KING said he had presented the subject for a record and had nothing to add at this time.

Replacement of Soft Palate (Abstract). Dr. J. Eastman Sheehan.

Dr. J. Eastman Sheehan described a procedure, as applied in the cases of three adult patients, for the replacement of the soft palate. All three were cases of total cleft-palate, which after several attempts at repair had been pronounced to be further inoperable. The method employed was to separate a layer of tissues from the adjacent palatal, tonsillar and pharyngeal areas; to swing these flaps up to where they could be joined along the palatal median line; and then to cover the denunded areas with Thiersch grafts, to avert the destruction of the newly-made palate which could be foreseen if contractures were set up in the process of healing if the Thiersch cover were not supplied.

The object of the procedures is to restore as much as possible the mechanism of speech, in regard to which the soft palate, in its relation with the pharynx, plays a part in the differentiation of sounds, as do the tongue, the teeth and the lips. In the enunciation of the nasal consonants (m, n, ng sounds) there is a slight movement of the palate towards the pharynx. It approaches that wall when the sounds of k, x, y, z are emitted. The orifice is closed altogether to admit of free transmission through the lips of the vowel sounds. In the absence of the soft palate incoherence of sound is inevitable and articulate speech impossible.

In the cases under review, attempts at repair through use of the tissues near the velar eminences had failed, and the opinion was that nothing more could be done.

On both sides of the pharynx, and extending forward into the mouth, there is a complex of muscles, most of which in their normal extension are inserted into and form part of the palate. Of these the most important are the palatopharyngeus, the palatoglossus, the salpingopharyngeus, the levator polati, and the tensor palati, each of which has a definite function in relation to the palate. Closely associated with them in position is the important superior constrictor muscle. In amongst them is the faucial tonsil. There is a reasonable expectation that if a velum can be formed from these muscles, their normal functions will be developed by use, both in and away from the velum. In the present instances this actually happened.

Incisions are made well above the superior horizontal line of the tonsil, carried downward well forward toward the cheek, then directly across the tonsil, to include its upper two-thirds, thence across the posterior pillar to include about a quarter-of-an-inch of the pharyngeal membrane, then up to a level with the original point of incision.

From the area thus outlined a strong flap is raised by deep separation, using long semi-curved scissors with blunt ends. The flaps are drawn up and sutured along the median line. Strong stay sutures are inserted. Beginning at the back, the needle enters about an eighth-of-an-inch back from the free membranous border and is carried back until a generous

portion of the muscular filaments which form the posterior pillar has been included. It is then brought out and carried to the opposite side, where the order is reversed, the needle first entering the muscles of the posterior pillar, thence forward to the membranous border and out. When the suture is tied the first stay of the new palate has been formed. The tonsillar materials are joined with three mattress sutures. Then the anterior area is stayed in the same way as the posterior. The membranes from front and back are now brought together underneath, a continuous surface thus being established.

These procedures are conducted under combined local and general anesthesia, with careful concern for the control of bleeding, especially in the tonsillar area.

Since the denuded areas cannot be left to epithelize, because of the destructive effect of the contractures certain to develop, they must be covered by Thiersch grafts. These are applied by the aid of moulded stents, held in place by a bar appliance attached to the teeth. The grafts are held in position for from eight to ten days, and for three days more no food is allowed to enter the mouth. Feeding during the whole period is through a duodenal tube of Einhorn, inserted through the nostril and passed down through the esophagus and stomach into the duodenum. The diet consists of 240 c.c. of milk, with one raw egg and 15 grammes of sugar of milk, well mixed and administered at blood temperature. The flow is sustained by use of a large glass syringe, every two hours from 8 a. m. to 8 p. m. Physiological salt solution is administered by the Murphy drip method per rectum, 350 c.c. in the morning and again late in the afternoon.

Pain for the first few days is controlled by doses of ¼ gr. codein sulphate, frequently given, allowed to dissolve under the tongue. The mouth is kept rigidly clean by frequent swabbing. A weak solution of potassium permanganate is recommended. Injection of a little magnesium usti through the tube is recommended if constipation develops.

For closure of the hard palate obturators were used in these cases, but full thickness skingrafts have been applied successfully and are certain to come more into use.

Patients should be recommended to an expert in speech training. The results are quicker and better than if they try to work out unaided a system of vocal production.

DISCUSSION.

Dr. Robert Ivy (by invitation) said that it was with great hesitation that he undertook to discuss Dr. Sheehan's paper, for he had had no experience whatever in this method, indeed very few have. He had come to hear what Dr. Sheehan had to say, and to learn all he could, rather than to take any part in the discussion.

A great many attempts have been made previous to this to supply tissue to fill in a defective soft palate. As Dr. Sheehan mentioned, skin has been taken from the outside surface, but there is no report in the literature where the tonsils have been used. Brophy, of Chicago, quite frequently uses the palato-pharyngeus muscle for lengthening the soft palate; that is his usual method and he claims to get very good results, but one could see that Dr. Sheehan's method might have advantages in certain cases over the Brophy method, for the latter cuts the muscle of the posterior pillar two-thirds through, and naturally the cut part is bound to contract to some extent; whereas Dr. Sheehan's method takes in not only the muscles of the pillars of the fauces but the superior constrictors and the tonsils between them, and gets tissue which is much less liable to contract. Therefore, while this work is new and untried to a certain extent, it should be kept in mind and given a thorough trial, and results reported. The main object to be striven for is the production of better function in the soft palate by getting longer and more flexible soft palates, for the main purpose is to have improvement in speech; unless there is a long, mobile soft palate there will not be any speech improvement, and the patients might just as well wear a mechanical appliance.

Dr. Henry Sage Dunning said it was very interesting to hear Dr. Sheehan bring out this new and fascinating subject. Last year he presented a method of epithelization of the antrum, and this new operation, which as Dr. Ivy said has never been reported, is even more fascinating.

Dr. Dunning said he has had no experience at all in using the tonsil as Dr. Sheehan has done, though he understood it has been used a great deal in other ways, but this operation is absolutely new. When in Chicago last week attending a meeting of the American Association of Oral and Plastic Surgeons, he had talked with several men who have done a great deal of palate work. The West leads the East in this kind of work, and these men felt that it was a good thing to do the palate first and take the tonsils out if they could not be used. In many cases they took part of the tonsil out and sewed it in, and helped to fill out the soft palate, but they did not have any definite method like this. Dr. Sheehan's method was most interesting, but there were several points of particular interest. It would seem almost impossible to do it in a young child, as it would be very difficult to keep a young child quiet and to treat it by this method; and if it is not done in early youth it would seem almost impossible to get enough tissue to assure good function in later life. One might anatomically fill the palate out as he does, but whether you would get good functional results seems doubtful.

As for keeping the parts clean, and applying the splints with these clever arms that he has shown, and the difficulty of all the apparatus, it seems to me appalling, but it is most ingenious and both he and the Society are to be congratulated upon this original work.

Dr. Dunning then asked the age of the patients, and also whether Dr. Sheehan, in the case shown on the screen, used an obturator to obtain part of the function, or whether he relied entirely on the palate which he makes to attain his end. It would seem that he would have to use an obturator with a tail piece to close off the nasopharynx, and would have to use one anteriorly to close off the cavity which he showed. It is a most interesting proposition, and we have all been trying to find some way to give an adequate and resilient long palate; and in a patient over 12 of 15 years of age it would seem almost impossible. The only time one could hope to do it would be in children under 1½ to 2 years of age; but after 5 years of age, it is hard to see how he can get the function.

Dr. Harold S. Vaughan said he had had the privilege of seeing one of Dr. Sheehan's cases very shortly after union was obtained, and was very much impressed by the appearance of the palate. It is a unique operation, and Dr. Sheehan is to be congratulated on the results obtained. It seemed, however, to be limited mainly to adults. Many cleft-palates are seen that have been operated upon several times; there is one redeeming feature in some of the failures; it is that hypertrophy of the palatopharngeus and palatoglossus muscles often occurs, making it possible to obtain enough tissue to close the defect by surgery.

Dr. Vaughan then said he had just shown three cases where he had used the posterior and anterior pillars for repair in cases otherwise inoperable. An oblique incision was made running from before backward well into the border of the muscles; the two ends were then turned back so they projected posteriorly. They were then sutured, forming a straight line. This method has the advantage of not cutting the muscle across, and gives a very perfect functioning palate.

The only experience he has had with Dr. Sheehan's method was to attempt to use some of the tonsil in a girl of 10 years, for an addition to the soft palate. This effort was unsuccessful, for the tonsil tissue was so soft an friable that it would not hold the sutures. It therefore seems that the method is limited to older patients unless tissue is taken external to the tonsil.

Dr. Vaughan believes that it is very important to close these cases surgically whenever possible; they are very much cleaner. The nasal

mucous membrane becomes healthier as a result of the approach to normal function.

Dr. Vaughan believes that Dr. Sheehan has made a valuable contribution to palate surgery, and expects to profit by some of his suggestions.

Dr. Voislawsky said he had been wondering if in one of these very successful cases that Dr. Sheehan had had, if his patient were to be so unfortunate as to have an attack of acute tonsillitis and if that particular case should fall into the hands of some laryngologist, whether he would not be tempted to remove the tonsils even after they had been superimposed upon the palate. With our modern surgery, whether the operation would not be quite as successful in this position as in the natural location of the tonsil.

Dr. Sheehan: I agree with Dr. Ivy that the Brophy method is a very good one. It is interesting to learn from Dr. Dunning the methods used by his Chicago friends. If I use the tonsil where they do not, it is with the object of giving body to the new palate. Probably the tonsils would atrophy, as Dr. Dunning fears, if we were not careful to give them a lining by turning under the membranes as described. It is the muscles, also, that carry the strain of the sutures, not the softer tissues of the tonsils. All this would be useless, however, unless lining was provided for the denuded areas. Without it the contractures would break down the new structure; certainly they would destroy its resilience.

I do not think this is an operation for children, but rather for those adults who, after one or more operations by other methods, have nothing left of the membranes ordinarily used. The three patients I had varied in age from 22 to 30. The field is limited. It is necessary to strike pretty deep into the musculature to get the tissues required for the repair.

Dr. Vaughan's cases were very interesting. I am not a cleft-palate operator, and therefore value the more highly the comments of those who have done much more of this work than I.

Dr. Voislawsky's suggestion about the eagerness to remove tonsils reminds me that when, some years ago, I applied a lining to the pharynx, a physician who was calle in to attend the patient later was deceived by the color of the Thiersch graft and wanted to give diphtheria antitoxin. Fortunately this was avoided.

Thirteen Foreign Bodies Removed from an Esophagus at One Sitting.
Dr. Sidney Yankauer.

The patient was an insane woman, about 50 years of age, who was trying to commit suicide and swallowed a large number of foreign bodies. The X-ray examination showed these foreign bodies in position, and not only the esophagus but the stomach and intestines were full of the same sort of things, a screw, four hair pins, a nail, a neeedle, a piece of pottery, a piece of glass, a safety pin, etc. They were all mixed up together, but fortunately the hair pins lay point downward, although the safety pin was pointing upward. The patient had to be put under general anesthesia, for it was not possible to control the woman otherwise. The foreign bodies were removed very readily with the exception of the large piece of pottery found at the bottom; it was very difficult to get hold of it and grasp it. The whole operation would not have occupied over half an hour had it not been for this piece of pottery. As it was, it took two hours. In spite of the two hours of general anesthesia required in removing this collection, and with the nails and screws etc., in her intestines, the woman made a good recovery and asked for food the next day. Since then she has passed the foreign bodies from her intestines and is physically in very good condition.

So far as could be learned, these articles had been in place for about two weeks. The last foreign body swallowed was a screw, which was swallowed within twenty-four hours of taking them out, but the others must have been there for two weeks. The woman was admitted to the insane asylum after coming from the West, and she vomited up a foreign body, and they X-rayed her and found these various objects.

A Canula for the Natural Orifice of the Antrum of Highmore. Dr. Sidney Yankauer.

The puncture of the antrum of Highmore is a very common procedure. And while it is usually perfectly inoccuous, not very long ago an article was published in Germany recounting nine deaths following puncture of the antrum. For a long time I have been using a canula for washing out this antrum, and once showed it before the Section, but after this article appeared it interested me to see in just how many cases we could actually pass this canula into the natural orifice, and I found that I could do it in fifty cases out of ninety. I tried all kinds of sizes and shapes of canulae, but finally found that this particular size and shape served in the largest number of cases. By using a somewhat different size and shape, we found that we could get into somewhat more antra, but of the forty cases in which we could not pass the first, we only succeed in four with the others, so that it hardly seemed worth while to go to the extra trouble for so few cases. However, with this particular size and shape it is possible to get into 50 per cent of all antra. The cases in which we tried this were not normal noses, but were noses in which puncture was indicated and antrum disease was suspected. In such cases we have to deal with a different type of nose than the normal ones, for we meet with hypertrophies and deviated septa, and other abnormalities.

Canulization of the natural orifice of the antrum has been done before; Killian devised a canula with half-an-inch of the end bent at right angles, but you could not be sure you were in the orifice with this shape of canula.

The canula which I have constructed is bent at right angles, but has a curve, so that it must be made right and left. This curve fits over the convexity of the lower turbinate. It is introduced along the lower turbinate and rotated until the point is in the middle meatus. When the point is in contact with the outer nasal wall in this region, the tip is moved backwards. The canula will enter the opening whether you start above or below the uncinate process. By keeping up a slight rotary pressure on the instrument you can feel it slip in very distinctly, and once it is in you can move it back and forth according to the size of the natural orifice. When the sensation is once experienced it is not easily forgotten.

This figure of fifty cases out of ninety, making 55 per cent, is rather large, much larger than is given by any text-book. But if we can do anything to diminish the possibility of such accidents as death from the puncture of the antrum, it is well worth while.

JOINT SESSION: SECTIONS OF OTOLOGY AND OF LARYNGOLOGY AND RHINOLOGY ENTERTAINING THE SECTION OF OTO-LARYNGOLOGY OF THE COLLEGE OF PHYSICIANS, PHILADELPHIA.

April 22, 1925.

Welcome by Dr. D. Bryson Delavan:

Gentlemen of Philadelphia, representatives of the Section on Oto-Laryngology of your fine College of Physicians and Surgeons, our distinguished and very welcome guests: A year ago you extended to us an invitation to come to your city, accept your always gracious hospitality, and spend an evening with you in the interchange of social fellowship and of scientific thought. Your invitation was gladly accepted, the occasion was in every respect successful; the evening full of pleasure and instruction was one long to be remembered. We returned home strongly desirous of reciprocating your kind attentions, and have ever since been planning to extend the hospitalities of New York to you, worthy representatives of the City of Brotherly Love. So, New York,

through the Sections of Laryngology and of Otology of its Academy of Medicine, bids you welcome tonight; New York, the birthplace of laryngology; New York, in which was founded more than fifty years ago the first Society of Laryngology of modern times today in full existence, your present host and entertainer; New York, the home of Horace Green, the father of laryngology, of Gordon Buck, the father of laryngeal surgery of Joseph O'Dwyer, the father of bronchoscopy, of Bosworth, the father of nasal surgery, of Lefferts, the master teacher; New York welcomes you of Philadelphia, that city of advanced learning and culture which has given to the world such brilliant contributors to our specialty as Physick, Harrison Allen, Carl Seiler, and first and last of all J. Solis Cohen, of whom you as well as all of our great country have reason to be proud.

Gentlemen, we appreciate your coming to us; we rejoice in having you; we hope that this may be but the beginning of many more such happy occasions. In the names of those who have gone before us, as well as in our own, we bid you an earnest and hearty welcome.

Demonstration of Artificial Larynx. Dr. John E. MacKenty.

Dr. MacKenty presented a new artificial larynx for use by patients deprived of their larynx by operation or for patients with an obstructed larynx having to wear a tracheal canula. Three patients were presented using the artificial larynx. Three other patients were presented using the stomach or buccal voice. These patients were deprived of their larynges on account of cancer. They acquire speech by filling the esophagus and stomach with air, belching this air into the throat and talking on it. These voices are gutteral but quite distinct in an ordinary sized room.

DISCUSSION.

Dr. Fielding Lewis said that it was very difficult to discuss something of which one has no knowledge but that certainly Dr. MacKenty was to be congratulated on the great success he was having with this apparatus. He had had the pleasure of seeing Dr. MacKenty demonstrate it a few weeks ago in his office and it seemed a splendid arrangement for these laryngectomized patients. That statement reminded him of the little boy whose teacher in expressing approval of a task said: That is fine. The boy replied: Hell, it's perfect!

As Dr. MacKenty had said, anything that will help these patients to speak will make it possible to save the lives of more of those who suffer from laryngeal cancer, for the first thing such persons ask is: "Will I have a voice after the operation?" Some, of course, have acquired a good buccal voice. Out of fifty-one cases on whom he himself had operated, only three have a buccal voice, two of them distinct enough to be heard over the telephone. In Philadelphia there is a vocal teacher who has had a large experience in teaching persons with defects of speech, together with these patients, and in studying with him how their voice is produced it is hoped that it will be possible to accomplish more for those who have not yet been able to develop a buccal voice. No doubt some will be greatly benefitted, but with others it seems to be of no use, and that is where the artificial larynx will be of great value. As Dr. MacKenty said, many attempts have been made, especially in Europe, to develop such an apparatus, and we should all be proud that an American has been able to develop an artificial larynx which will act so well. Dr. MacKenty is certainly to be congratulated on his achievement.

Maxillary Sinusitis of Oral Origin. Dr. H. S. Dunning.

DISCUSSION.

Dr. George B. Wood said that it was really worth the trip all the way from Philadelphia to be able to attend a meeting so interesting, so instructive, and accompanied by so much good will and kindly feeling.

Dr. Dunning's paper on the treatment of maxillary sinusitis was exceedingly interesting and most instructive. On the whole, he was in accord with all that Dr. Dunning had said, although he had not had as

large an experience in the closure of aveolar fistulae as Dr. Dunning has had. Judging from his own experience, Dr. Wood believed that the majority of the cases of maxillary sinusitis, both acute and chronic, originate from nasal infections, and also that the involvement of the ethmoids so frequently seen in these cases is secondary and not primary.

In years gone by, in those cases of chronic maxillary sinusitis which were dental in origin, he had sometimes followed the suggestion of Dr. Freeman, Philadelphia, and treated them by an aveolar opening made through the socket where the tooth had been extracted and kept open by a dental plug made of hard rubber. Though some of these cases finally got well, he considered this method of treatment greatly inferior to the intranasal work, and has entirely abandoned it.

Dr. Wood agreed absolutely with Dr. Dunning that dental men should not undertake the treatment of maxillary suppuration. These cases belong in the domain of the rhinologist. However, he felt that the diagnosis of the condition of the teeth, whether they were vital or non-vital, did belong to the dentist and he should have the final say as to the advisability of extraction. The orthodontist should never, even when the extraction of the tooth opens up the floor of the maxillary sinus, make an attempt to treat the sinus through the opening or through an enlarged one. He had found that when the opening through the aveolus into the antrum was large, the use of a hard small rubber plate, as suggested by Dr. Dunning, was very satisfactory.

In the large majority of cases, the radical operation, in Dr. Wood's opinion, should only be done after intranasal surgery has failed to cure. Also, when a radical operation, such as the Caldwell-Luc, is undertaken it should be a hospital operation, though the simple opening through the inferior meatus can be done in one's office if he is equipped to do surgical work. When the radical operation is done, Dr. Wood believed that the removal of the mucous membrane from the antral cavity is seldom called for. It has been his practice to traumatise the mucous membrane as little as possible, except where there is actual caries of the bone, and the cases apparently heal up just as promptly as though they had been thoroughly curetted.

Dr. Dunning, in closing the discussion, said that the cases to which he had referred were chronic cases, the ones that do not clear up but keep on suppurating, and by finding out whether the teeth are infected, etc., he could do as he had stated. Finding out whether the teeth are infected, however, is sometimes difficult. Often when a tooth is extracted the extractor takes out the tooth but leaves the process there, and between the dentist and the rhinologist the patient still suffers from the process. There is infected membrane and tissue.

The Caldwell-Luc operation should be done only in bad cases. Working in the office with local anesthesia the patient is co-operating with you; there is very little shock for the patient if he is properly prepared, and there is much less trouble under local than under general anesthesia. After the operation the antrum through the base is packed tight so that there is little danger of secondary hemorrhage, and the patient is sent home in very good condition. As a rule the hemorrhage is not great, for the antrum is packed with iodoform gauze.

Paper: **The Clinical Significance and Diagnostic Value of Tuning Fork Tests for Hearing.** Dr. Arthur B. Duel.

Paper: **The Clinical Value and Diagnostic Significance of the Newer Tests for Hearing.** Dr. Edmund Prince Fowler.

DISCUSSION.

Dr. B. Alex. Randall said the matter of tuning fork tests greatly interests me; and I speak as a firm believer in such tests, with considerable skepticism as to the newer methods of audiometer, etc. There is much room for question as to what tones are actually employed in these newer tests, for we are well aware that marked transposing of tone takes place in such apparatus; as the telephone transmitter, al-

though conveying much of the individuality of a speaker's voice or other tones, presents to the listener a deep basso as an elfin treble. It thus affords in most instances none of the magnification claimed, but merely adapts deep tones to an ear capable of hearing the high only. The microphone was long since shown to be of little aid to the deaf as regards conversational tones; but the modern audion seems a true magnifier of sound waves and a means of studying and hence recording, perhaps only in paraphrase the quantitative audition. I regret not having brought my diagrams of the tuning fork tests; for they can make at least as clear cut and convincing a showing as those for the audiometer. Like Dr. Duell, I believe in the great diagnostic usefulness of the forks to the practicing aurist; for a few simple tests can in minimum time give the needed data for diagnosis and prognosis.

Not all the forks of the shops are what they claim to be; but on the kymographion the exact vibration rate is easily read for each, while its note can be purified of overtones. Its energy of vibration is approximately standardized if it is allowed to fall of its own weight through its own height to strike upon the muscle cushion above the knee. One hundred such trials will vary hardly 10 per cent in its duration of audibility. A low, a medium and a high-pitched fork suffice for most needs; and I find an A of about 200 d.v.s., with a duration of 70-100 seconds, the most convenient for most tests. Held before the meatus with its tines pointed at the ear (the position of maximum audible and minimum palpable vibrations), it should be heard at some 40 c.m. or for 100 seconds as it is gradually approached to the ear; while with its handle resting on its own weight upon the mastoid it should be heard about half so long.

Resting the handle of the vibrating fork upon any part of the midline of the head, it can furnish a generally reliable Weber test of lateralization of the bone conduction, especially if in the Roosa-Rinne test at the ear the patient has been brought to realize that it can be heard through bone in an ear claimed to have long been totally deaf. But if rested on the bridge of the nose (Gardiner-Brown) this becomes an admirable quantitative measure, as we note by how many seconds longer or shorter time it is heard than it is felt by the examiner's fingers. The normal duration for the fork employed, +— this figure, gives in a moment the true Swabach test of bone conduction for that fork. The simple Roosa-Rinne test of "louder front or back" is very brief, yet reliable; just as Pierce's plan of thrusting the handle occludingly into the canal makes the same tuning fork one of our best "noise apparatus" for excluding that ear from hearing the voice and can thus unmask most malingerers. The too-little-used test of Politzer as to whether the vibrations of the fork held before the nostrils are heard louder or not in swallowing, tells as to active patency of the Eustachian tubes in most valuable fashion, without any inflation and its prerequisite cleansing of nose and tube mouth; and the neurologist is borrowing our tuning fork to test the deep sensibility of muscle and other structures.

Thus a simple, inexpensive and easily portable tuning fork in the Roosa-Rinne, Gardiner-Brown, Weber and Politzer tests can at the bedside or office in a minute or two give us most of the needed data for our diagnostic localization and measurement of deafness.

Dr. Curtis Eves said that few men have had the opportunity to do experimental research work that Dr. Fowler and others enjoy. He knew very little about this work and could only express his appreciation of the work these men are doing with the hope that something valuable will come from it.

Few otologists know enough to discuss it intelligently at the present time. The main point in all the newer experimental work is that some time-saving, reliable tests of the hearing will be found which will point out the conditions existing.

It would seem that something of real value is about to come from this experimental work.

DR. DUEL said that he held no brief against the newer method of examining ears and was watching with much interest the progress that was being made. In regard to the question of the accuracy of the fork tests as compared with that of the newer methods, one could only say that there was opportunity for improvement in both cases. His own experience with the audiometer had taught him that it was very possible to make many mistakes; for instance, he had asked an expert to make two tests of his own hearing by the method just described and had tried to be as fair as possible in his answers. What he had done, however, which the operator was not aware of, was to press the receiver of the apparatus lightly against the ear in the first instance and in the next to press it a little more tightly. The tests were made by an enthusiast, but the slight difference in pressure made a great difference in the result. When the produced tones reach the upper register, say above 512, very frequently on close pressure of the receiver against the ear they will not be heard, while if the receiver is slightly removed they will be readily perceived. It is obvious, therefore, that some method of standardized pressure must be devised in order to prevent egregious errors.

Dr. Duel reiterated, however, that he did not wish to appear hypercritical of the newer methods of testing, but that having used the tuning forks for more than twenty years the concepts of hearing which he had been able to obtain had been eminently satisfactory both as to diagnosis and prognosis, and if today he was obliged to choose between having, say, five tuning forks, or all the newer apparatus, he would choose the tuning forks, because with the latter he could not get as clear a concept of the patient's condition.

DR. E. P. FOWLER, in closing the discussion, again agreed with what Dr. Duel had said. All of these details have to be watched. The objection in regard to uneven pressure was overcome by using a spring. He had himself always used the same spring apparatus, and had had no trouble in that respect. There was always trouble with the higher tones, and he was not satisfied with the results from them.

As for the tuning forks, in his opinion we often fool ourselves as to what we are getting. Recently he had made some hundreds of tests with tuning forks, and found that even trained observers will get very different results; therefore, one or two observations with tuning forks are not accurate. If you are going to use the Rinne test, this is the difference between A and B conduction; that is one thing. It is a very valuable test, and the Weber test is valuable, and tricky, too. If you use a tuning fork as the test and tell the person to close the ear, he will lateralize the sound to the closed ear, if he presses gently. If he presses too hard with his finger the sound will lateralize to the opposite ear. Tuning forks will play as many tricks as the audiometer. The trouble is one is not always on the lookout with these instruments. The right way was to do as Dr. Duel said, take the good, and try to improve all the time. Unless these experiments are encouraged we will not learn much about our testings; and we won't know what little means. We are doing it according to the book, but it seems doubtful whether a diagnosis founded thereon is true or not.

A Method of Barrage Anesthesia for Mastoidectomy. Dr. Isidor Friesner.

Dr. Friesner said that this was not a new method of anesthesia, but was the well known method used by the neurological surgeons applied to otological surgery, and was first introduced to him three or four years ago while assisting a general surgeon, Dr. William Kline, of New York, in operating on a child who could not take a general anesthetic. Before that he had seen a number of attempts at local anesthesia for mastoidectomy, with a little local anesthesia and much vocal anesthesia, and he was astonished at the facility with which the operation could be performed after the introduction of the local anesthesia in the manner about to be described. He had since used it a number of times with almost invariable success. The one important difference between this method and the ones heretofore employed is that no attempt is

made to infiltrate either the periosteum or subperiosteally. The fact that the nerves supplying the periosteum come into the latter through the soft parts is the basis of the procedure. Four points are selected: one above, over the temporal muscle; one behind; one immediately in front of the tragus; and one below the tip. A little ethyl chlorid is sprayed first, and then by means of the hypodermic syringe ½ per cent of novocain is injected here and makes a small wheal; a second and a third injection are made here and here; then these are joined so that we have laid down a barrage of anesthesia. The final point is that the needle is introduced at the juncture of the upper third and middle third of the canal wall, and this area is infiltrated with 1 per cent novocain. No attempt is made to infiltrate directly into the area where the wound is made.

Dr. George M. Coats said that when he was first asked to discuss this method he did not know what was meant by the term "barrage" nor did any of his colleagues either in Philadelphia or anyone whom he had seen since he reached New York, but in a general way he had worked out by analogy about what it must mean. During the war local anesthesia was used for many operations which had before been done only under general anesthesia. Of course, the infiltration method was the one always used for mastoidectomy and it had been most successful, but he had been much interested in this method described by Dr. Friesner and would certainly try it. In any method it does not seem necessary to carry the anesthetic solution below the periosteum. One advantage in local anesthesia is that there is less hemorrhage and it would be interesting to know whether this barrage method will give the same amount of hemostosis. Of course the adrenalin and novocain do cut down the hemorrhage and give a comparatively bloodless field. There is doubt that local anesthesia for mastoidectomy is a very useful procedure, especially in those cases where general anesthesia is more or less contra-indicated. In cases of diabetics, a local anesthesia mastoidectomy will save many patients, and it is indicated in nephritics, heart and pneumonia cases, etc.

One point in connection with local anesthesia by the infiltration method would probably apply to the barrage method also. Dr. Coates then told of how a few weeks ago an assistant was operating on a case of sinus thrombosis and in working near the tip had asked him to watch the face. While doing this he remarked that the "facial has gone" About twenty minutes later, however, the nerve was functioning again. The function had been completely interfered with for a short time, which was undoubtedly due to the deep injection below the tip of the mastoid. Age is no contra-indication—the youngest patient thus operated upon being fourteen.

Dr. Friesner, replying to Dr. Coates, said that after the anesthesia is applied in the way described and before starting the operation, the tip is more thoroughly infiltrated. The first time this was presented to him, adrenalin was used, but he did not think it was necessary. The amount of bleeding from the flaps was so insignificant that it was not worth while to control it. As for the vascular bleeding, the vessels had to be clamped. He had thought it would be painful to clamp the vessels, but found that clamps could be applied to the edge of the wound without causing pain. One should be careful in infiltrating the tip, and not go too deep. He had not found it necessary, even when stripping the aponeurotic fibres or cutting that it made very much difference even where quite a little force was required, to detach the fibres. The anesthesia was perfect and he had yet to see a case of facial paralysis.

Dr. Fielding Lewis: Ladies and Gentlemen: As Chairman of the Visiting Section I wish to express to the Oto-Laryngological and Rhinological Sections of the Academy our sincere appreciation of your generous hospitality and also of this very splendid and instructive evening. It seems to me that this spirit of comradeship between the oto-laryngologists of these two great cities is a step in the right direction. We become better acquainted, and the meetings are very instructive. I hope that next year in return you will be our guests.

THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

REGULAR MEETING, CADAWALDER HALL, COLLEGE OF PHYSICIANS.

Tuesday, January 6, 1925.

The Problem of Focal Infections in the Nasal Sinuses. Dr. E. Ross Faulkner.

DISCUSSION.

DR. ROSS HALL SKILLERN: Anyone who has familiarized himself with the subject must have remarked on the number of papers appearing in the past two years on focal infections from the cavities of the head. As far as the sinuses were concerned most of my cases resulted from some condition of the ethmoids, and these cases were rarely hidden varieties of infection. It need not be in all the cells of the ethmoid; it may indeed be in a single cell. I do not know of anything more difficult than to find one of these obscure ethmoid cells which is causing the condition. A very small infection and with very little pus may cause serious things as endocarditis, interstitial nephritis, etc. I am not prepared to give statistics in regard to ethmoids, but roughly speaking would think infection from them constitute about 80 per cent.

Take five cases, if you will, traced to sinuses. Four out of these cases will have their origin in the ethmoids, very rarely in the frontals. The ethmoid infection undoubtedly travels into the system by vascular system. The infection from the sphenoid travels into the throat and then into the stomach through the alimentary canal.

Dr. Faulkner has covered so much of this material. He spoke of antiseptics. I fully agree with him. I have never been able yet by washing out the cavities with these to accomplish any more than I would with ordinary warm salin solution.

I am deeply sensible to the possibilities of this subject and feel it is going to be a very important one in the next few years.

DR. JUDSON C. DALAND: The study of the relationship of the toxins to the micro-organisms in systemic infections secondary to focal infection is of great practical value. I am quite certain that in many cases the toxins produced by the micro-organism are the chief factors in causing disease elsewhere. It is not unusual to observe systemic infection from infective sinusitis continuing for months or years, and in one case of chronic periapical dental infection, I ascertained that the infection had existed for twenty-two years.

It is important to remember that a very small amount of infective tissue in the sinuses, especially if shut off from access to the air, is capable of producing serious secondary consequences.

I am quite certain that occasionally a chronic infective ethmoiditis exists, and at the same time there is infection of the ethmoidal cells shut off from communication with the cavity lined by an infective membrane or polypoid growths, and that this small shut-off area of infection, which may be purulent or may at times be infective without the presence of pus, is the essential cause of the persistence of the secondary manifestations of infective ethmoiditis.

So far as my clinical experience is concerned, I find that the ethmoid is the most common seat of infection, though not infrequently the sphenoid is involved, separately or in conjunction with the ethmoid. Although maxillary sinusitis is common, it has not produced systemic infections very frequently as compared with ethmoidal sinusitis.

My experience coincides with that of Dr. Faulkner, who states that the otolaryngologist should not make a diagnosis until he has made

multiple examinations. The absence of pus does not absent infective sinusitis. The presence of pus makes the diagnosis.

Occasionally sinusitis occurs due to streptococcus hemolyticus or viridans, which, when shut off from the air, may exist without the presence of pus, precisely as it does around and about a periapical dental infection. This condition is perhaps more common than we believe, and can only be diagnosed by an acute observer.

Vaccines are usually of little or no value if a focus of infection is unremoved, but are of very great value when all infection has been removed, more especially in the aged and debilitated.

It is all-important that the vaccine should be made promptly, from fresh material, so that the strain of the organism is the same as the one from which the patient is suffering. It is also equally important that the dose should be accurately graduated to the requirements of the patient, and increased gradually at five-day intervals, so as to build up immune bodies and avoid a systemic reaction.

Occasionally, when the vaccine is given to a patient from whom all foci of infection have not been removed, I have observed a marked reaction from a small dose.

In conclusion, may I urge that the oto-laryngologist give a special study to the diagnosis of infective sinusitis, so that by new information thus secured, we shall be able to more quickly diagnose and remove infective sinusitis.

Dr. M. S. Ersner: An erroneous impression which is very prevalent is that the antra are not important foci of infection. I repeatedly noticed, however, than an acute follicular tonsillitis will follow an antrum puncture, especially when the antra infection is of a chronic nature. Recently a chronic maxillary antra was punctured and within twenty-four hours, an acute follicular tonsillitis developed with a temperature of 104° and within seventy-two hours there was a frank poliarticular rheumatism. This patient was ill for several months with polyarthritis and endocarditis.

In suppurative ethmoiditis, I find that hot silvol in the form of tampons is a most useful therapeutic agent. My attention was drawn to this drug by my friend and teacher, Dr. Ross H. Skillern, and I feel very grateful to him for this suggestion, as my patients improve very rapidly with this treatment.

Specific and nonspecific proteins are a great asset in chronic suppurative conditions. I generally administer diphtheria antitoxin to patients who have been operated upon for mastoidectomy and whose wounds do not heal as rapidly as they should. At the end of the mastoid season, we usually have about six or eight "hangers on" whose wounds do not heal, and it is surprising that within a short time these wounds clear up after 5 or 10,000 units of antitoxin has been administered.

In several instances a diphtheroid organism has been isolated from the mastoid wound but we at no time did the guinea pig test and are therefore unable to state definitely whether this was a true diphtheria organism or the psuedo-diphtheria, which is a contaminator. It will be interesting to note whether the concentrated diphtheria antitoxin will have the same effect as the old antitoxin.

Dr. G. M. Coates: I was interested greatly in what Dr. Faulkner had to say about the value of vaccines in sinus diseases. In my experience, vaccines have been a help under certain conditions. There is but little use in administering vaccines in a chronic sinus condition until thorough drainage has been established. Now in such a case as that, we will note that even after drainage has been established it often takes a longer time to secure a dry sinus. In these cases, vaccines, I believe, help secure the local result and also help to control the results of the focal infection, arthritis or whatever they may be. Is it always necessary to use an autogenous vaccine containing the specific organism?

This, I think, we do not know, as a good deal of immunological work reported recently has been along the lines of nonspecific protein therapy, even going as far as milk injections in place of bacterial suspensions.

I want to call your attention to the fact that the ophthalmologists are apparently obtaining results in their infected eye cases by the use of diphtheria antitoxin which, of course, is nonspecific for these cases. It is often hard to find the focus of infection in our arthritis cases. The teeth, the tonsils and the sinuses are the most to be suspected in that order. While no time should be lost, it is usually possible to have the teeth X-rayed at the same time that the sinus X-rays are taken. Of course, the tonsils are always suspicious.

I have been interested in watching a good many cases of asthma in recent years and attempting to find foci of infection in them. In quite a large percentage of such cases, we find some infection either in the teeth, tonsils or sinuses. Quite a large proportion is discovered in the latter. Furthermore eradication of such a focus, even if it is a small one, not infrequently causes great relief.

Another aspect of focal infection that Dr. Faulkner did not speak of is progressive deafness. As you know, Emerson, of Boston, has laid down the law that practically all cases of progressive deafness are due to foci of infection and frequently date back to childhood. Of course, in these cases the tonsils are the most common offenders, but as shown long ago by Coffin, Dean, Armstrong, Skillern and others it is not uncommon to have an acute and chronic suppuration in the sinuses in young children and that even in infants there may be precocious sinus development and consequent infection.

I have enjoyed Dr. Faulkner's paper very much and feel that he has given us a great deal to think about.

DR. FAULKNER (closing): I agree with Dr. Skillern that the ethmoids are most prone to become infected and second to them are the sphenoids.

Although only small foci may be noticed in the teeth they, however, occupy an important place in focal infection. I also agree with Dr. Daland in regard to vaccines, especially when administered properly. I was skeptical for a long time as to the true value of vaccine but I have since learned that they occupy an important place when properly employed.

I have been very much pleased with the kind reception given me this evening by this Society. Thank you!

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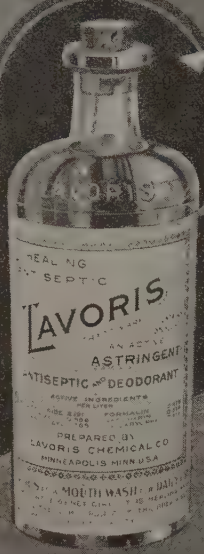

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THE
LARYNGOSCOPE.

VOL. XXXV SEPTEMBER, 1925 No. 9

ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

THE PRESENT STATUS OF VESTIBULAR TESTS IN INTRACRANIAL CONDITIONS.

DR. LEWIS FISHER, Philadelphia, Pa.

A great deal has been written and said about the merits and demerits of a vestibular examination. Some surgeons and neurologists are enthusiastic about the value of such an examination in suspected cases of intracranial lesion, while others do not find it at all necessary to resort to this method of study. Obviously, no one can state authoritatively just what the present status is. At the University of Pennsylvania, in the service of Dr. Chas. H. Frazier, where practically all intracranial cases are studied neuro-otologically, the same question presented itself. For years the vestibular tests were carried out upon many hundreds of cases with suspected brain lesion. The neuro-otologic examination would be made, the findings and conclusions sent to the surgeon or neurologist in charge and the case lost sight of. Many of these patients drifted away without any opportunity appearing for verifying the diagnosis. Others were operated upon or posted without the knowledge of the otologist so that he was unaware, most of the time, whether he was wrong or right in his premises or conclusions. In order to get some idea of the real place of a vestibular examination, as an aid in diagnosis, Dr. Frazier suggested that the records at the University Hospital be examined for several years back and those cases selected, which were definitely verified either by opera-

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tion or autopsy. This was done by Dr. F. Grant, of his staff, who examined the records and findings in 103 cases. Such a study should throw some interesting light on the real present status of the value of vestibular tests. The cases analyzed were as follows:

1. Cerebellopontileangle tumors, twenty-nine cases.
   (a) Vestibular examination correct in twenty-seven cases.
   (b) Vestibular examination incorrect in two cases.
   Vestibular examination made diagnosis in four cases.

2. Tumors of Fourth Ventricle, three cases.
   Vestibular examination confirmed in three cases.

3. Midline Infratentorial tumors, two cases.
   Vestibular examination confirmed in two cases.

4. Cerebellar Lesions, twenty-eight cases.
   (a) Vestibular examination correct in twenty-one cases.
   (b) Vestibular examination incorrect in five cases.
   (c) Cerebellum ruled out by vestibular examination, in two cases.

5. Cerebral Lesions, twenty-eight cases.
   (a) Hemispheric lesions.
      1. Vestibular examination correct as to side of lesion fifteen cases.
      2. Vestibular examination ruled out posterior fossa lesion in ten cases.
      3. in three of these cases, vestibular examination alone, made diagnosis.
   (b) Pituitary Lesions, thirteen cases.
      1. Vestibular examination correct as to location in ten cases.
      2. Vestibular examination ruled out posterior fossa lesion in two cases.
      3. Vestibular examination incorrect in one case.

It is obviously impossible in the limited scope of this presentation to discuss or cite many of these cases. It might be profitable however, to refer to a few in order to illustrate the types of cases seen as well as the methods of neuro-otologic study.

Case 1: W. O., age 30 years, examined a few months ago, developed tinnitus and difficulty of hearing. Last October, he consulted several otologists in his home town, who treated him with tubal

inflation, etc. The last otologist he consulted found it necessary to do a submucous resection of his septum and remove his tonsils. His tinnitus, deafness and vertigo, instead of improving, became worse. He developed some twitchings of the left side of the face and a little numbness in the left arm. Occasionally, he would have projectile vomiting. As recent as seven weeks prior to our examination he was placed in an institution at home for general study and observation. However, nothing outside of a local ear condition could be discovered. This is recorded to illustrate how faint or few may be the signs of intracranial neoplasm. He continued getting worse and came to Dr. Frazier's Clinic at the University of Pennsylvania. When he presented himself to the neuro-otologic clinic, we found that he had a spontaneous nystagmus in every direction, which at once indicated a brain lesion of some sort. The after-turning responses were all much diminished. The right ear was stone deaf and without responses to the caloric tests from the vertical or horizontal canals. The left ear produced a fair response from the vertical canals, while the horizontal canal produced a good nystagmus and fair past-pointing with a conjugate deviation of the eyes to the left. A diagnosis of cerebellopontileangle tumor, on the right side was easily made in spite of the fact that the vertical canals on the opposite side still retained their function. This was proven several days later when Dr. Frazier successfully removed a tumor from the right cerebellopontileangle. While it is true that at the time of his arrival at the University, there was sufficient clinical evidence to make a diagnosis and that the correct state of affairs was probably known to the surgeon, before he was sent for the neuro-otologic examination, it is nevertheless also true that our examination was purely otologic and our conclusions arrived at independently, were based directly upon the findings obtained from the vestibular tests. What is more, there is no doubt that a neuro-otologic examination, at the very onset of his illness—at the time when the ordinary clinical findings were absent—would easily have made the diagnosis. The patient would have been spared the unnecessary nose and throat surgery and could have been operated on for his true lesion much easier.

Case 2: A. S., illustrates how the neuro-otologic examination was the only means of arriving at the diagnosis. This patient was confined for almost a year in the department for Mental and Nervous Diseases of the Pennsylvania Hospital, without any definite diagnosis. Various neurologists diagnosed it as paresis, or frontal lobe tumor. When we were asked to see her she was totally blind

and stone deaf, in both ears, and unable to walk. The difficulties of an otologic examination in such a patient can easily be imagined. She could not see or hear and was generally intractable. Douching the right ear produced no responses whatsoever. When the left ear was douched, with the head in an upright position, there was no response. When the head was put back there appeared a vertical nystagmus, fairly rapid and active, instead of the normal horizontal nystagmus. We reported to Dr. Strecker, the physician in charge, that the patient had a cerebellopontileangle tumor on the right side. Almost a year later the woman died and an autopsy showed the presence of a large tumor on the right cerebellopontileangle.

Case 3: A. G., age 19 years. Complained of: headaches, failing vision, vomiting; adiadokokinesis, right side; dysmetria, right side; falling to left; marked Romberg; papillitis, three to four diopeters; nystagmus in all directions.

Neurologic diagnosis: cerebellar tumor, side uncertain.

The neuro-otologic clinic reported as follows: "There is a well developed spontaneous nystagmus to the right, left and upward. The vertical canals on both sides do not respond to stimulation while the horizontal canals do—indicating increased intracranial pressure. The nystagmus from the horizontal canal is perverted, suggesting that the lesion is probably close to the brainstem. Turning produces prolonged nystagmus, but almost no vertigo, suggesting brainstem irritation from a lesion posterior to it. Both cerebellopontileangles are uninvolved. The patient has probably a cerebellar lesion involving both hemispheres, but mostly on the left side.

The operative findings disclosed a large gliomatous type of tumor of the vermis extending into each lateral cerebellar lobe and down on left side of pons.

In this case, the diagnosis of a cerebellar lesion was made neurologically, but the otologic examination quite independently, not only arrived at the same diagnosis, but indicated more correctly the extent of the lesion.

Case 4: J. H. P., age 44 years. Chief complaint was pain in the left side of face and head; failing hearing and vision; eighteen years ago injury to left side of face in molar region; eight years ago developed pain in this region and twitching in left corner of mouth; five years ago, hearing became less acute, especially in right ear; two years ago, slow loss of visual acuity, especially when pain is intense; five weeks ago pain in left side of face and head became so marked he was compelled to stop work. Pain is above left eye

and radiates backwards over head and down into left shoulder. Constant tinnitus, left ear; staggers to left, and objects whirl to left; mentality sluggish and all responses delayed; spasmodic tic left side of face; hearing greatly impaired bilaterally; no motor or sensory changes—serology negative; bilateral papillitis 1½ D; fields normal; spinal pressure 10 m.m. Hg.

X-ray: slight clouding right ethmoid sinuses. Pituitary seems slightly enlarged. Teeth negative.

Clinical diagnosis: Optic neuritis toxic origin.

Vestibular examination: cochlear divisions, eighth nerve, both right and left, function normally; past-pointing unduly long but not exaggerated; vertical canals right and left produce no responses to douching; oblique nystagmus on douching left horizontal canal; tendency to conjugate deviation to right from right horizontal canal.

Summary: Prolongation of past-pointing suggests irritation of vestibulo-cerebello-cerebral pathways within cerebellum. Loss of responses from vertical canals suggest increase of pressure against floor of fourth ventricle which is corroborated by oblique instead of horizontal nystagmus after douching left horizontal canal. The tendency to conjugate deviation to right from right horizontal canal suggests a right-sided cerebral lesion. Cerebellum and both cerebellopontileangles may be excluded.

Operation four months later revealed a large gliomatous tumor right frontal lobe.

Case 5: M. F. M. Complained of left-sided headache; vomiting; blurred vision; diplopia on looking down and to right; weakness of left sixth nerve; spinal pressure, 30 m.m. Hg.; papillitis 6 D; fields normal.

Neurologic diagnosis: basilar meningitis unknown origin. Internal hydrocephalus.

Vestibular Examination: Both eighth nerves function in both cochlear and vestibular divisions; vertigo and past-pointing responses normal both ears; quick component of nystagmus to right is interfered with; no reaction from vertical canals both sides.

Summary: Posterior fossa and cerebellum negative. Definite interference with quick component of nystagmus to right suggests left-sided cerebral lesion.

Operation: right subtemporal decompression for relief of pressure.

Patient died two years later. Autopsy revealed large frontotemporal subcortical glioma in left cerebral hemisphere.

In this case the neuro-otological examination definitely indicated the presence of a left-sided lesion as accounting for the increased intracranial pressure.

Case 6: A. P., age 25 years. Complained of headache and failing vision. Four months ago, flashing of colors before eyes mostly on right followed by headache; headaches have since increased; vision is failing and has photophobia. There is diplopia; projectile vomiting; dizziness, vertigo and staggering to right; papillitis 4½ D; lumbar pressure 15 m.m. Hg.

X-ray: some convolutional atrophy of skull.

Clinical Diagnosis: brain tumor suspected unlocalized.

Vestibular Examination: hearing normal, both ears; spontaneous past-pointing right arm, suggesting right cerebellar lesion; absence of nystagmus on douching right ear with head in upright position indicates interference with nerve pathways for eye-movement within right pons; marked past-pointing of each arm to the left and right, suggests that the cerebellum is intact. Exaggerated past-pointing suggests supratentorial lesion irritating the cerebellum by pressure. Pressure from this lesion could account for the absence of nystagmus on stimulating right vertical semicircular canals and for perverted nystagmus from left semicircular canals and for paretic condition of the external recti muscles.

Summary: Ear examination suggests normal labyrinths and eighth nerves, normal cerebellum and brain-stem. Hyperactive responses, chiefly those in past-pointing suggest pressure on cerebellum from above tentorium.

Operative Findings: Puncture of corpus callosum and right subtemporal decompression relieved condition somewhat. Patient discharged. Autopsy a month later showed tumor on posterior aspect of the left occipital lobe of cerebrum. Considerable destruction of brain tissue and cavity had worked forward and had almost broken into left ventricle.

This case showed such a confusion of neurologic data that the only clinical diagnosis possible was a suspected brain tumor with no idea as to its location. The only operation that could be attempted logically, was a subtemporal decompression with a puncture of the corpus callosum. The autopsy later, however, showed that this patient had an occipital lobe tumor located directly above the tentorium and pressing down upon the cerebellum. In other words, exactly where the neuro-otologic examination suggested the lesion to be.

The study of this considerable number of proven cases is naturally helpful in crystallizing vestibular values. As otologists, we are interested particularly in the group of cerebellopontineangle cases. There, the first symptoms are frequently aural and the otolaryngologist is the first doctor consulted. The phenomenon-complex of a totally destroyed ear on one side, with nonresponsive vertical semicircular canals on the side opposite the lesion, and good responses from the horizontal canal on that side, was found to be very reliable. To be sure there were quite a few variations from the typical picture, such as, eight cases, retained hearing on the side of lesion, seven retained function of the vertical semicircular canals of the opposite side; but if one adhered to the principle that a case of this type must show unmistakable neuro-otologic evidence of a central lesion, then the diagnosis can be made with certainty. It might also be mentioned that in angle lesions, the findings obtained in an ear examination are more positive and more reliable than the findings obtained in any other type of examination, but only in this type of case should the otologist maintain his ground even when his opinion does not coincide with the neurologic one. Since cerebellopontileangle lesions are fairly frequent the neuro-otologic examination, even if it does nothing else, serves quite a role in intracranial diagnosis.

Vertigo and past-pointing were found to be reliable indications of the condition of posterior fossa contents. A cerebellar lesion, with very few exceptions, should show impaired vertigo and past-pointing. However, the presence of good vertigo and past-pointing is even more strongly indicative of a normal cerebellum. Another feature of cerebellar lesions is the lack of susceptibility of those patients to vestibular stimulation. Nausea, pallor, sweating and vomiting, as a result of douching and turning, were practically never encountered in cases of cerebellar disease and its presence was used almost as a definite indication that the lesion, if present, is not cerebellar.

No definite phenomenon-complex has been noted for cerebral lesions. Spontaneous, vertical nystagmus may or may not be present; the vertical semicircular canals may or may not respond, the after-turning nystagmus may be shortened or lengthened or be normal, but it has been noted, that cases with cerebral neoplasm can tolerate but very little vestibular stimulation before nausea or vomiting appear. Frequently, neurologic cases require the differentiation as to whether the lesion is supra- or subtentorial. The sus-

ceptibility or nonsusceptibility of the case to ear stimulation can frequently determine that point in a way that no other type of examination can. Thus, given a patient with unmistakable neuro-otologic signs of a brain lesion, who is easily made sick by turning or douching, the case is cerebral. If, on the other hand, large doses of ear stimulation do not upset the patient, the lesion is cerebellar. The presence of a conjugate deviation of the eyes, following stimulation, instead of a full nystagmus is a fairly accurate indication of the side on which the lesion is located.

It must not be imagined that the entire series of cases recorded were like the few just cited. In most of the cases, the neurologic studies disclosed the true nature of the case. It is interesting, however, that the neuro-otologic examination, made entirely independently and without the knowledge of the neurologic findings, and conducted by otologists unskilled in neurology reached the conclusions as shown by the above figures. What is even of greater importance is the fact that in a number of cases, of which some of the reported ones are illustrative, the otologic examination was the only method of study by which a diagnosis could be made. The results of the successes and failures as portrayed by the above analysis state fairly well the *Present Status* of *Vestibular Tests* in *Intracranial Conditions.*

HERPES ZOSTER OTICUS: A CASE WITH INVOLVEMENT OF THE FIFTH, SEVENTH, EIGHTH AND NINTH CRANIAL NERVES AND WITH A COMPLETE VESTIBULAR EXAMINATION.*

DR. FRANK L. DENNIS, Colorado Springs, Colo.

In 1900, Head and Campbell[1] demonstrated the close pathological resemblance between inflammation of the posterior ganglionic chain in herpes zoster and that of the anterior horns of the spinal cord in acute anterior poliomyelitis. This lead to the designation of specific herpetic inflammation as "acute poliomyelitis posterior", which term was adopted by Hunt.

Herpes zoster oticus has been observed by a number of writers since 1871, among whom are Anstie, Green, Blake, Buys, Berger, Vail, Berens and Neumann. But it was not until the exhaustive researches and publications of Hunt[2] that the disease was well understood. His studies, published in 1910, were based on eighty-seven cases of herpes of the cephalic extremity and include a report of nine personally observed cases of herpes zoster oticus.

In Vail's case,[3] presented as a thesis before the American Laryngological, Rhinological and Otological Society in 1906, the brunt of the attack was borne by the upper cervical ganglia; there was no eruption on the auricle and no facial paralysis. The canal had one vesicle on the posterior wall.

There is no doubt that herpes zoster is an infectious disease, although the specific causative agent has not been identified. This question is discussed in an editorial in the *Journal* of the American Medical Association,[4] based on the experimental work of Teague and Goodpasture and of Lipschütz. These observations were published in August and December, 1923. They produced in animals, by inoculations with the virus of herpes simplex, a disease identical with human herpes zoster. They believe that herpes zoster is due to a virus "differing from the virus of herpes simplex only in virulence". They proved that the virus of herpes febrilis can pass along the nerves from the periphery to the brain or spinal cord. Flexner[5] produced encephalitis in a rabbit by inoculation of the

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cerebrospinal fluid from a case of cerebrospinal syphilis; this virus induced vesicular keratitis and dermatitis in the inoculated rabbit and, on cross testing, displays the same immunity reactions as does the herpes virus. These experiments seem to indicate that the infectious agents of encephalitis, herpes simplex and herpes zoster are closely allied.

Emerson[6] saw a case in which the diagnosis of localized encephalitis was made on account of the marked drowsiness. The spinal fluid showed a cell count of 86 with 99 per cent lymphocytes, which suggests the diagnosis of herpes zoster and substantiates Hunt's statement that increase of lymphocytes in the cerebrospinal fluid, because of its frequent occurrence in herpes zoster, would have diagnostic significance in obscure cases. Hunt believes that the so-call rheumatic affections of the eighth nerve may be expressions of herpes zoster of the auditory ganglia without herpes. Likewise, many cases which we regard as rheumatic paralysis of the face, soft palate or even larynx, belong to the group of acute posterior poliomyelitis cases. In Emerson's patient the tonsils and one maxillary antrum were infected and these were the supposed exciting causes of the herpes.

In the published cases, exposure to cold is often given as the etiological factor or the disease is regarded as being of rheumatic nature. In one of Beck's cases he thought repeated attacks of peritonsilar abscess were the source of infection and several writers have removed diseased tonsils because of their supposed causal relationship to herpes zoster. Emerson removed the tonsils and drained the antrum in one of his cases.

PATHOLOGY.

The characteristic pathological changes in herpes zoster are swelling and edema with engorgement of the vessels and small hemorrhages throughout the affected ganglia; degeneration of some of the nerve cells; degeneration of the fibres in the posterior root central to the ganglion.[7] Usually the ganglion of one nerve bears the brunt of the attack, those above and below it being affected to a lesser degree and not sufficiently to cause herpes in their skin zones. Only one side is affected as a rule, although Trautmann[8] reported a case of double herpes auriculae in 1907. It is conceivable that, were the jugular ganglion of both sides affected simultaneously, serious consequencies might ensue.

Typically, herpes zoster oticus is a primary involvement of the geniculate ganglion of the seventh nerve (Fig. 1). From here the inflammation frequently spreads to adjacent ganglia: Scarpa's and

Corti's ganglia of the eighth, the petrous ganglion of the ninth and the jugular ganglion of the tenth cranial nerves. According to Hunt and Cushing,[9] the auricle, auditory canal and tympanic membrane are supplied with sensory fibres from several nerves. The fifth nerve supplies the anterior part of the auricle, the anterior part of the tympanic membrane, canal and meatus. The posterior, mesial and part of the external surfaces of the auricle are supplied by the auricular branches of the superficial cervical plexus; the area between the distribution of the fifth nerve in front and the cervical plexus behind (*viz:* the posterior part of the drum membrane and

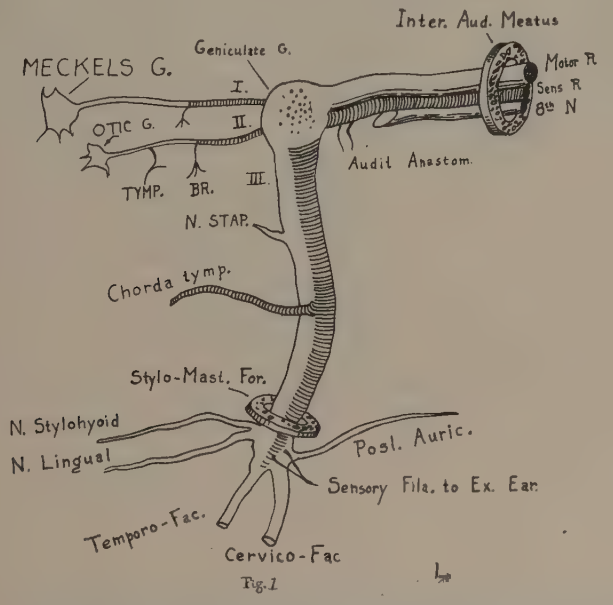

Fig. 1. Diagram, showing relations of the seventh and eighth nerves, geniculate ganglion, connections with Meckel's and the otic ganglia and branches of the seventh nerve. (Redrawn from Hunt's article in Archives of Internal Medicine.)

the external auditory canal, concha, tip of antitragus, antihelix and fossa of the antihelix) is innervated from the geniculate ganglion of the seventh, the petrous ganglion of the ninth and the jugular ganglion of the tenth cranial nerves (Fig. 2). The otic ganglion belongs to the sympathetic system and its nerve cells are multipolar; it is not susceptible to the virus of herpes zoster.

Hunt[10] says: "All the posterior spinal ganglia, as well as the ganglia of the fifth, seventh, ninth and tenth cranial nerves are devel-

oped from outgrowths of the embryologic structure known as the neural ridge. These ganglia are all of the so-called unipolar or spinal type. Peripheral ganglia of the auditory nerve, homologues of the posterior spinal ganglia, take their origin from the neural ridge also, although their cells retain their primitive bipolar character and, in common with other ganglia having this origin, are susceptible to the specific inflammation of herpes zoster. A recent investigation has shown that, in these ganglia, a few unipolar cells are demonstrable in man."

SYMPTOMS.

Most cases have constitutional symptoms for a few days before the eruption appears, such as malaise, headache, fever and aching, together with pain in and around the ear. There may be nausea,

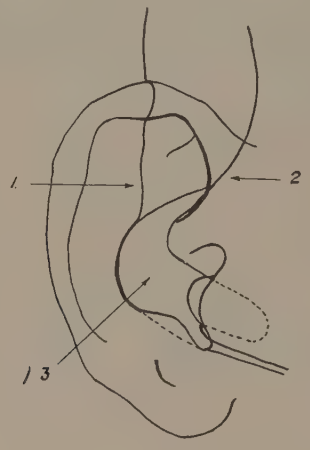

Fig. 2

Fig. 2. Diagram showing area of distribution of the superficial nerve supply of the external surface of the auricle. 1. Area behind this line supplied by the second and third cervicals. 2. Area in front of this line supplied by the fifth cranial nerve. 3. Area lying between lines supplied by the geniculate, petrous and jugular ganglia. (Drawn from description by Hunt and Cushing.)

vomiting and sore throat, depending on the ganglia affected. If the ganglia of the eighth nerve are involved, there will be deafness, vertigo, nystagmus and loss of equilibrium. The eruption is vesicular and is confined to definite areas. The vesicles soon become converted into brownish scabs which eventually loosen and are cast off. Paralysis of the facial nerve is complete in all three divisions and accompanies or follows the appearance of the eruption. Taste on

the affected side of the tongue is abolished. If the ninth and tenth nerves are involved, vesicles appear in the pharynx and larynx and Dan Mckenzie[11] has reported one case with recurrent laryngeal paralysis. In his case the fifth, seventh, vestibular branch of the eighth, ninth and tenth cranial nerves were involved. Herpes was present on the auricle, posterior wall of the meatus, right malar eminence, edge of the tongue, pharynx and larynx. The drum membrane and the hearing were normal. Curiously enough, the cochlear branch of the eighth nerve escaped.

When the cochlear branch is affected, the loss of function may be complete or the evidence of its participation may be only tinnitus and hypoacusis. If Scarpa's ganglion is involved, there is loss of excitability of the vestibular apparatus.

With eruption of the drum membrane, if pain and tenderness over the mastoid are present, together with pain in the ear, and

Fig. 3.

Fig. 3. Diagram to show distribution of eruption in case reported.

fever, otitis media is frequently suspected and the true condition may be overlooked. These symptoms are so suggestive, that it is not surprising that paracentesis is often done.

Recovery is the rule. Sometimes it is fairly rapid, often it is prolonged and occasionally, deafness and facial paralysis persist. Hunt, Jaehne[12] and Muck[13] saw such cases.

TREATMENT.

The treatment is entirely symptomatic. Anodynes for the pain, cleansing and a simple ointment for the eruption are needed. If it can be reasonably suspected that diseased tonsils or sinuses are the source of the infection, appropriate surgical measures are indicated.

Galvanic or Faradic stimulation of the facial area is useful in protracted cases.

CASE REPORT.

I have had the opportunity of studying only one case of herpes zoster oticus: D. J., age 31 years, consulted me on Feb. 1, 1924, complaining of pain in the right ear and dizziness. The family history is negative. He has always been a strong, well man except for measles and mumps in childhood and occasional attacks of tonsillitis. He has three healthy children. Habits are good except he uses a great deal of snuff. Two weeks ago he had something like "grip", with sore throat, aching and fever; after four days there was pain in the right ear and jaw which persisted until yesterday. Simultaneously with the pain he became dizzy and had tinnitus, which are still present. External objects appear to turn to the right. He has vomited twice. Today he noticed that he could not spit straight. Eruption appeared on his ear some time ago but he cannot say exactly when. Recently he has had double vision.

Examination: The patient is a strong, healthy looking man, who must be supported when walking because of vertigo and staggering. There is complete right-sided facial paralysis, involving all three divisions. The right pupil is smaller than the left; the right auricle is swollen and exhibits crusts and vesicles which have the following distribution: tragus, concha and fossa of the antihelix (Fig. 3). The posterior wall of the external auditory canal and the whole of the membrana tympani are covered with eruption. On wiping off the dirty grayish scabs from the drum membrane, the surface is red and moist looking. There is no eruption on the mastoid nor on the posterior or mesial surface of the auricle. The right mastoid is tender; the right side of the pharynx and the right pillars are red and sparsely covered with yellowish white points (ruptured vesicles).

A neurological examination by Dr. F. T. Stevens is, in brief, as follows: "Tremor of jaws, tongue, lips and hands; tongue in midline and protrudes straightly. Pupils react to light and accommodation; no definite strabismus, although the right eye turns out slightly on looking upward or downward; the optic discs are redder than normal, the right being the paler. Deep reflexes increased and equal; no Babinsky, Oppenheim or Chaddock. No sensory loss. No loss of corneal reflex; taste on the right anterior half of the tongue abolished; right facial nerve paralyzed. Joint sense normal."

Hearing: Complete deafness for $C,^{64}$ c and c^4 forks in the right ear; hearing in left ear normal. Weber lateralized to the left.

Vestibular apparatus: Spontaneous nystagmus in all directions of gaze except on looking downward; on looking upward there is a mixed nystagmus which is vertical upwards, combined with diagonal upward to the left. Pointing normal. Romberg: Falls backwards; falling direction changes with changed position of the head. Staggers to the left.

Turning: To the right: good reaction of proper kind of nystagmus, lasting 20 seconds; correct pastpointing; vertigo 8."

To the left: No nystagmus, no pastpointing; vertigo 2."

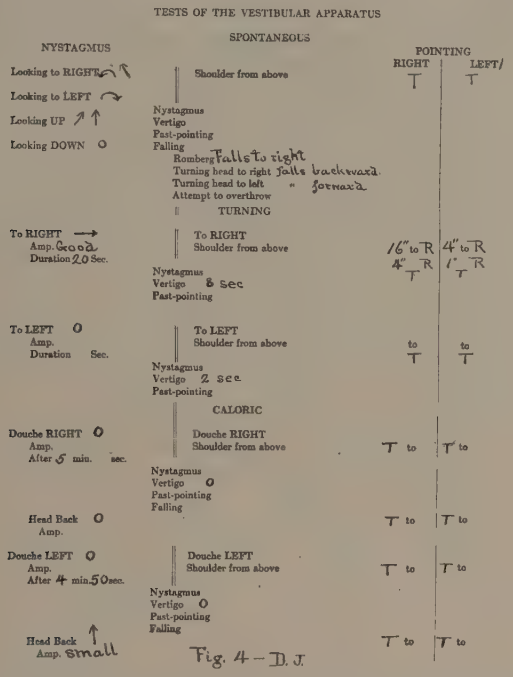

Fig. 4. First vestibular examination. Note the spontaneous nystagmus, absence of reaction in right ear, no reaction from left vertical canals and a perverted reaction from the left horizontal canal. Vertigo response subnormal. It is noteworthy also that, on turning to the left, there is no nystagmus and pastpointing in spite of a good response on turning to the right.

Douching (68°). Right ear: no reaction after 5 minutes.

Left ear: no nystagmus from the vertical canals after 4′:50″; no vertigo; no pastpointing. Head back: a quick, fine vertical nystagmus upward; no vertigo; no pastpointing (Fig. 4).

The patient was sent to the hospital and a paracentesis was done, which revealed a dry tympanum. Cultures from the throat grew chiefly pneumococci. A Roentgen-ray picture of the right mastoid was entirely negative. The urine was normal; white blood count

10,260; no Wassermann nor spinal puncture was made. Temperature normal.

Five days after admission the herpes was disappearing, the right middle ear was dry. At this time he complained that for two days he has had pain and soreness of the right temple and jaw and is tender over the exit of the right supra- and infraorbital nerves. Vertigo and nystagmus have disappeared; Romberg negative.

On Feb. 9, the left ear was douched: no nystagmus nor vertigo from the vertical canals; from the horizontal canal the nystagmus elicited was oblique upward to the right, combined with horizontal to the right of good amplitude; vertigo present. Again on Mar. 24

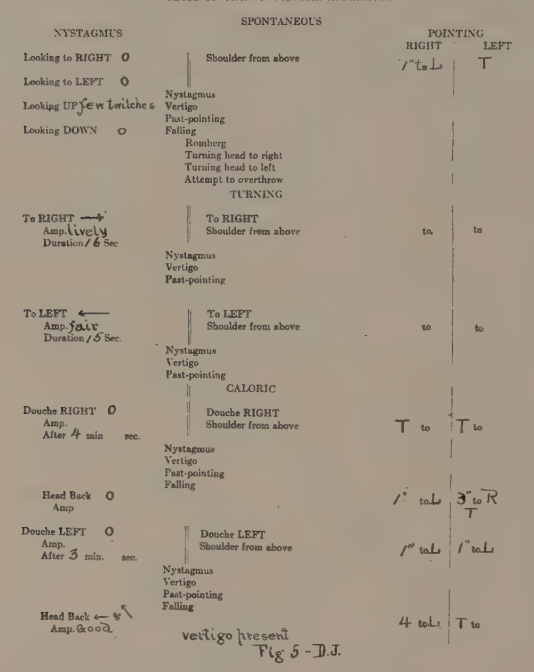

Fig. 5. Vestibular examination two months after onset. The spontaneous nystagmus has disappeared; nystagmus is now present on turning to the left, but on douching there is still no nystagmus from the right ear, none from the left vertical canals and that from the left horizontal canal is perverted. The pastpointing is erratic.

his left ear was douched with the same result. Thirteen days after admission the herpes had disappeared.

On February 26, the hearing in the right ear for all three forks was returning, paracentesis opening almost closed, middle ear dry. A galvanic test of the ears was negative on both sides for a current of 6 m.a.

Ten weeks after admission examination revealed: both drum membranes normal, hearing in the right ear distinctly improved, although the Weber is still to the left. No change in the facial paralysis. A vestibular examination shows some returning function, although there is still no nystagmus from the vertical canals on either side, and from the left horizontal canal the same perversion is present that existed previously; the right horizontal canal is unexcitable (Fig. 5).

In November, eleven months after his attack, a letter from the patient says that he is not doing well; his eyes are all right and the face has "straightened up" but he is still deaf in the right ear and has attacks of vertigo and staggering, with tinnitus.

COMMENT.

This is a typical case of herpes zoster, involving either the geniculate or the auditory ganglia primarily and spreading to the petrous and jugular ganglia, as evidenced by the herpes in the throat and the distribution of the eruption on the ear. It is noteworthy that the anterior wall of the external auditory meatus showed no eruption, which would apparently rule out participation of the ganglion of the trigeminus were it not for the fact that the tragus had a few vesicles on it; the pain and tenderness over the supra- and infra-orbital foramina, appearing some time after the onset, also points to a mild inflammation of the Gasserian ganglion.

The involvement of both branches of the eighth nerve was complete as indicated by total deafness of the right ear, vertigo, loss of equilibrium and nystagmus, and lateralization of the Weber to the left ear. The change in the falling direction according to the position of the head points to a peripheral lesion, but lack of reaction from the right and left vertical canals, no reaction from the right horizontal canal and, especially, a perverted nystagmus from the left horizontal canal is very suspicious of a central lesion. It is, in fact, a typical vestibular picture of right cerebello-pontile angle lesion. This suspicion is strengthened by the information that, eleven months after the onset, he still feels unwell, is deaf, dizzy, staggers and has tinnitus, even though the facial paralysis has recovered.

It is unfortunate that repeated observations of this man cannot be had, but this is impossible as he lives a long distance from Colorado Springs and attempts to get him back have so far been unsuccessful. There is no doubt that he suffered from a typical attack of herpes zoster oticus, whatever other coincident disease may be present.

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301 Ferguson Building.

X-RAY OF MASTOIDITIS.

Dr. S. G. Dabney, Louisville, Ky.

Miss Y., age 15 years, very nervous, was taken with an acute suppurative otitis media with bulging of the drum. Free incision was followed by profuse discharge. There were many mastoid symptoms, not only for the first five or six days, but even for two weeks. The extreme nervous character of this young lady made it difficult to ascertain how much actual tenderness was present, and also how severe the pain was. An X-ray examination made about a week after the onset of her trouble showed very slight cloudiness in the cells—repetition of this examination made four or five days later showed no increase in cloudiness. The X-ray was here of valuable assistance in deciding not to operate, and a complete recovery was made without operation.

I could mention several other cases in which the X-ray as I interpreted the report, greatly assisted in deciding against operation. I am inclined to think that unless the clinical symptoms are positive a slight cloudiness of the mastoid cells does not call for operation —it does given an additional reason for further careful observation.

Case 2: A man of about 40, brought in by his physician from a town in the interior of the state. Acute suppuration of the middle ear beginning with tenderness over the mastoid and some fever, together with pain on that side of the head; these were the symptoms that existed two weeks ago. On visiting me practically the only symptoms were profuse suppuration, sagging of the upper posterior wall of the canal, and tenderness on firm pressure over the mastoid; the tenderness was not very marked, and for ten days there had been no headache, no pain and no fever. Because of the duration, however, of the tenderness and continued suppuration with the sagging of the posterosuperior canal wall, I advised early operation. The patient was much averse to this and almost determined to go home immediately. He was persuaded, however, to have an X-ray picture taken, and when this showed extensive destruction of the cell walls he was greatly impressed and agreed to operation, which was done that afternoon. The X-ray in this case corroborated the clinical symptoms and induced the patient to undergo operation which he needed, but it is equally true that operation would have been advised even before we knew anything of the X-ray because of the clinical symptoms—indeed, I would still have

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advised operation (though probably unsuccessfully), if the X-ray picture had been negative.

It seems to me that this brings up a question to which I may refer later—is it always wise to have an X-ray made, even when we have made up our minds from the clinical symptoms to operate? Granting that there are some advantages in this, we must remember the possibility of the X-ray contradicting the clinical symptoms and causing confusion, and we should also remember that to a large number of our patients the additional expense of the X-ray is to be considered.

Besides these two classes represented by these cases I could mention several others in which the X-ray picture had been of material assistance.

Now I wish to refer to a few in which it has been misleading:

Case 3: About three months ago I was asked to see a young lady of about 20, who, after an acute suppuration of the middle ear with rather severe symptoms was still, after two weeks time, having profuse discharge from the ear; great pain localized over the mastoid bone and keeping her awake at night; marked mastoid tenderness, and sagging of the upper posterior wall of the canal. It seemed a typical picture of acute suppurative mastoiditis. I was asked by the family physician and the attending aurist to express my opinion in the presence of the patient. I told her "if she did not have pus in the mastoid bone she ought to have it". I may say that her attending aurist had already expressed this opinion, in which the family physician coincided. My suggestion of having an X-ray picture was agreed to, but without much enthusiasm on the part of my colleagues and, rather odd to say, the family seemed to favor early operation. The financial condition of the family was affluent and the cost of the X-ray was not to be considered. This examination was made about 6 o'clock on Saturday evening. Sunday morning the young lady was taken to an infirmary and an X-ray picture made. To my very great surprise the mastoid was declared to be *free from any disease.* The young lady's menstrual period was going on at the time, and we decided to wait a day or two. The clinical symptoms, perfectly typical of a mastoiditis, continued unchanged. Two days later the mastoid was opened and as soon as the cortex was removed the pus welled up in large quantity.

Case 4: This patient happened to be almost identical with the preceding one. A young lady of about twenty had suffered with profuse suppuration of the middle ear for a little over two weeks. When she reached the infirmary, about 9 p. m., from her home in

the state found a temperature of about 101°; great mastoid tenderness; pain in the region of the mastoid; profuse discharge, and sagging of the upper posterior wall of the drum membrane. X-ray made the following morning showed only *slight cloudiness of the mastoid cells.* On the strength of this, and thinking perhaps her symptoms the night before had been aggravated by her travel, I postponed operating for two days. Again as soon as I removed the cortex out welled the pus.

I am aware that in both these cases there is a possibility that the pus had developed between the time the picture was taken and the operation, which was forty-eight hours or a little more, but in view of the perfectly typical mastoid symptoms which had been present in both for a week or more previous to my first examination, and in view of the fact that these symptoms continued unchanged for the two or three days preceding operation, I am forced to believe that there was pus in the mastoid at the time of the X-ray picture.

Case 5: A few months ago I saw in consultation with one of my colleagues a boy age 14 years, with an acute suppuration of the ear, which had been complicated a few days before I saw him by paralysis of the external rectus muscle of the same side, and by slight pain in the temporoparietal region; there were no symptoms of meningitis or of brain abscess, nor, as it seemed to me, of mastoid disease. I suggested that it was a case of mild Gradenigo syndrome, and that the boy would recover without operation. A few days later an X-ray picture showed a little cloudiness in the mastoid cells, but as there were no other mastoid symptoms, unless you would so consider those above mentioned (and I do not think they are mastoid symptoms), we decided to wait.

The boy has made a complete recovery without operation.

Case 6: Recently I was asked to see a child with marked symptoms of masotid abscess which had developed suddenly. On reaching the house I found a little girl of about 8 years whose family gave the following history: A week or two previous she had had a little sore throat with some swelling in the glands of the neck. She seemed to make a good recovery from this and had gone to school on the day before I saw her. She had been sent home because of earache. The tisues back of the ear swelled up very rapidly, and an hour or two before I was called the family physician had been summoned. The child had fever of 103,° decided pain about the ear and over that side of the head and was so tender all around the ear and over the mastoid that I found it impossible, even with repeated trials, to tell whether the tenderness was more marked on

pressure about the auditory canal or on pressure over the mastoid. She would scream wherever she was touched in this area. It was impossible to get a satisfactory view of the drum membrane at this time. The auricle was pushed well forward and there was great redness and edema over the mastoid. The picture at first sight presented strong evidences of an acute mastoiditis, and yet I had great doubts of this diagnosis; first, because of the rapid onset of the symptoms; second, because of the absence of suppuration from the ear, though of course we know that mastoiditis can occur without that, and third, the facial expression and general appearance of the child did not indicate to me as grave a malady as mastoiditis. However, I thought it best for the child to go to the infirmary that evening, which she did. At nine o'clock under general anesthesia, on examining the drum membrane and finding it red, I made a free incision into it; there was no discharge of pus for thirty hours, and then it became very profuse; the white blood count was over 33,000; an X-ray picture the next morning showed *evidence of mastoiditis with beginning breaking down cell walls.*

Notwithstanding these laboratory reports I decided to wait a few days. Some simple ear drops and hot ear douches were the only treatment carried out. In three days the fever was all gone, the swelling and tenderness greatly lessened, and there was profuse discharge from the drum. This discharge, however, subsided remarkably quickly, and the child left the infirmary on the sixth day well except for a very slight discharge which has become progressively less. In ten days she was well. It would appear unlikely that there was any mastoid disease in this case. As she recovered the inflammation in the posterior wall of the canal became more evident. Odd to say, in the course of the syringing, the dried remnant of a small fly or gnat was washed out from the auditory canal. The family were certain that this insect had been in the ear since last summer. Can it be possible that this little foreign body in the canal led to misinterpretation of the picture?

Case 7: I mention this case chiefly in the hope that the gentleman through whose courtesy I saw it will give us more complete information than I now have.

Mr. A., age about 37 years, seen through the kindness of Dr. —. When I saw him it was a case of thrombosis of the lateral sinus. A mastoid operation had already been done. The case was one of acute exacerbation of long standing chronic suppuration. The X-ray picture in this case seemed to show sclerosis; some sclerosis was found at the operation, but there was considerable choleasteatomatous mass packed in the mastoid. This raises the question of

whether the X-ray is valuable in the diagnosis between a sclerotic condition of the mastoid and cholesteatoma.

The gentleman made a good recovery from his infected sinus after a skillful operation by the colleague with whom I saw him in consultation.

Of course these few cases—indeed, all of my own experience, would not for a moment permit any final conclusions, but it would appear that much has yet to be learned in regard to interpreting mastoid X-ray pictures. It is frequently said that the picture should be interpreted by the attending surgeon and there is much in favor of this. On the other hand, it should be remembered that the Roentgenologist probably sees such cases from a number of aural surgeons, and therefore would acquire greater experience than any one of them. It would seem to me that his knowledge would be greatly increased if he could be present at each operation in which he had made an X-ray picture; next to this it would appear desirable for him to have a frank and complete report on the operative findings and to keep that along with the picture.

Realizing fully my very small experience I still offer the following as tentative conclusions:

1. In the presence of positive clinical indications a negative X-ray examination should not deter us from operating.

2. This should be explained to the patient or family before the picture is made in such cases.

3. The most valuable report from the Roentgenologist is the statement that the cell walls are broken down.

4. No great importance is to be attached to the report of slight cloudiness of the mastoid cells unless at the same time the clinical symptoms are positive.

5. In doubtful cases X-ray examinations repeated at several days interval may be of much value.

6. In chronic suppurative otitis media it has long been known that sclerosis of the mastoid generally exists. In these chronic cases the X-ray often shows only the sclerosis, and does not inform us as to such other conditions, as cholesteatoma.

7. To understand the relation of the X-ray picture to clinical symptoms, it is desirable to keep the record of operative findings in connection with the picture. Because of his having opportunity to see the work of many surgeons, I think it would be best for the record to be kept by the Roentgenologist, who should familiarize himself reasonably well with the anatomy of the temporal bone; I am aware that this view is not generally held.

911 Starks Building.

A CASE OF CHRONIC PURULENT OTITIS MEDIA WITH SEVERAL INTRACRANIAL COMPLICATIONS.*

Dr. Benjamin H. Shuster, Philadelphia.

Patient, P. G., age 35 years, white, male.

My purpose in reporting this case is not so much to advance something new as to record a series of stormy and unpleasant experiences and to relate some of the puzzling problems that arose and had to be coped with. The patient developed so many complications which centered around a chronic purulent otitis media, that he could well be presented as a small text-book on Intracranial Complications of Otitis Media. The multiplicity of the complications and the method employed to cope with them I thought would be of sufficient interest to merit the presentation of the case.

When the patient first came to my attention he was sent to me by Dr. J. J. Simkins, his family physician, for an examination of his ears, which had been discharging for some time and, what was worse for the patient, his hearing was rapidly failing and had been reduced to the point where it interfered with his normal occupation.

An examination of his ears showed a purulent discharge from both sides with some bad odor; there were polypi protruding into the auditory canals and there were no eardrums left. Hearing was about three feet in the right ear and about six feet in the left ear for the loud voice. He could not hear the whispered voice, Weber to the right and the Rinne was negative, bone conduction being somewhat diminished. It was apparently a conductive deafness due to the middle ear suppuration.

Nose: The septum was deviated but not enough to interfere much with his respiration; there was no free pus. The postnasal space contained some mucus and the nasopharynx was glazed.

There was a chronic pharyngitis, both tonsils were chronically inflamed and liquid pus could be expressed from several crypts.

The thought immediately arose that if the infection surrounding the Eustachian tube could be eliminated the chances for improvement would be better both as to hearing and for the suppuration.

Here the first puzzle arose. The man gave a history of pulmonary tuberculosis that was at present dormant. He also had had tuberculous laryngitis, which had been arrested. The question was, would a tonsillectomy cause a setback in his general condition or not, and was it worth while risking that for a chance of improving

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his hearing. As far as the patient was concerned he was between the devil and the deep blue sea. His hearing was becoming impaired enough to risk losing his employment. After all evidence pro and con was considered, a tonsillectomy was done under local anesthesia, and all precautions were taken not to break down his bodily resistance, by prolonged rest in bed and by giving him sufficient food. He apparently stood this operation fairly well as he lost very little weight. His throat was sore for a week or ten days and then gradually ceased to bother him.

Treatment was next directed to his ears. I removed as many polypi as were visible, employed in turn various local antiseptics, including iodoform dustings, boric acid, mercurochrome, alcohol and various forms of wicks and drains, and vaccines were also tried. At one time I took a smear from the discharge of both ears, after thorough cleansing, and stained it. I found the staphylococci and streptococci and by the Zihl-Nielson method I found the tubercle bacillus. I took precautions to rule out the smegma bacillus by acid decolorization, but the germ was acid fast. If it were some other acid fast bacillus I do not know, nor do I venture to say that the bacillus was responsible for the ear condition, because I am not certain. The germ may have been forced into the ear through the Eustachian tube and lodged there without taking part in the causation of the otitis; or it may have had its share of responsibility. At any rate I used chalmoogra oil for some time without perceptible benefit. Local treatment to his nose and Eustachian tube was not overlooked and carried out faithfully.

The result of the treatment was not satisfactory, his discharge continued, polyps reformed and his hearing was getting worse.

Vestibular tests showed markedly diminished vertigo and nystagmus from all canals, both to rotation and caloric tests. There were no perverted responses nor were there any spontaneous reactions.

X-ray examination of both mastoids showed no breaking down of bone, but sclerosis on both sides.

Treatment was continued for a month or so when the patient received his next complication. About the end of June, 1924, he took sick suddenly with what appeared to be an attack of acute indigestion. He was suffering from nausea, occasional vomiting and felt dizzy. He was under the care of his family physician who, because of his dizziness, asked me if the ears might have anything to do with his illness. I called on the patient at his home. He complained of nausea, had vomited several times and felt dizzy, his dizziness being worse when he moved his head. To me his dizziness and nausea meant more than indigestion; I had but to look at

the patient's position in bed, fearful of moving his head and glancing at me sideways through the corner of his eyes, which showed nystagmus; all of these signs informed me that we were dealing with something grave. His nystagmus was vestibular in character, the quick component to the left side. He slept on his left side and refused to move his head or eyes for fear it would make him dizzy. It is here worth while to emphasize the fact that no patient with a chronic purulent otitis media, when taken acutely ill, can have any diagnosis made of any ailment until ear complications can be ruled out. Here was apparently an innocent case of acute indigestion which turned out to be a labyrinthitis, one of the gravest conditions with which we have to deal. It might have been any other condition which starts with a little fever, headache, nausea, etc.

The patient was in bed a week while his symptoms of nausea, dizziness and nystagmus were gradually subsiding. At about the end of ten days a slight paresis of the facial nerve on the right side was noticed. This lasted for a few days and then slowly began to disappear.

The question now was, what should be the next course to be pursued. Should a radical mastoidectomy be done and probably drainage of the labyrinth be instituted at once or should I wait until the inflammation of the labyrinth should get into the latent stage, when it would be safer to operate? I feared the infection of the meninges while operating during the active stage. I consulted my chief, Dr. Coates, who agreed with me that it would be safer to mark time for a while and then do whatever surgical procedure might be indicated. The fact that it might be a serous labyrinthitis with a possibility of complete recovery without operation was not to be overlooked.

The patient was out of bed in about three weeks after the onset of this last illness. He complained of slight ataxia and that his vision was somewhat impaired. There was occasionally present some slight nystagmus, which I thought might account for what he thought was imperfect vision. He was gradually gaining strength, his facial paresis has completely disappeared and my thought was to at least do a radical mastoidectomy as soon as the patient recuperated. The rotation test elicited a very slight response from the canals on both sides. There was slight nystagmus as well as vertigo.

This plan was soon spoiled by what occurred next. The patient developed an attack of acute mastoiditis on the opposite side, which needed immediate attention. A mastoidectomy had to be done and I was not unmindful of the patient's general condition and particularly had in mind the limitation of the patient's resistance. To do

a radical mastoid operation on both sides at the same time was more than what I thought the patient could withstand.

I consulted Dr. Coates and he advised that a radical operation be done on the acutely inflamed side under local anesthesia. This we did together and the patient got along quite well. His wound healed and the discharge on that side gradually diminished; the other side, that is, the one in which there was a labyrinthitis, apparently did not annoy him and he went to the country for a rest.

He was there for about two weeks (middle of July to early in August) when he began to complain of some headache, mostly over the vertex and frontal region. A few days later he was brought home by the family because his headache became very severe and they thought that occasionally he talked irrationally and could not articulate certain words.

When I examined him I did not observe any aphasia, but he complained of severe headache and his pulse was slow and regular. It was as low as 58-60 and there was no fever. Dr. Samuel Loewenberg, the medical consultant, thought that the patient was developing a meningitis, basing his diagnosis on the slow pulse and the headache, which are often present in the early stages. He thought that it was probably tubercular because the patient was tuberculous. His depressed appearance together with the headache, slow pulse, absence of any chill or chilliness or rise of temperature and the lack of mental alertness or excitability inclined me to the diagnosis of brain abscess rather than one of meningitis. There were, however, no localizing signs of abscess, though there was a suspicion of Kernig's sign and Tache cerebrale. I had the patient admitted to the Medico-Chirurgical Hospital and then arose the most difficult and pertinent question—what next?

The patient was admitted to the hospital, Aug. 11, 1924, and notes made by Dr. Hamlin, the resident Otolaryngologist, state that he was mentally confused, deaf, and was unable to express himself. Dr. Hamlin had the patient under constant observation during his stay at the hospital. He obtained various consultations, and made many important notes, which I freely incorporate in this report. His assistance in the ward and in the operating room on this case were to me invaluable, and I take this opportunity to express my appreciation to him.

Dr. Mershon examined the patient's eye grounds and found them entirely negative.

A neurological examination was made by Dr. Patten, Aug. 12, and the following is his report: "Ocular movements full, pupils react to light and convegence. Right leg a little more flaccid than

left, the foot at rest being in eversion, no ankle clonus or Babinski. Right knee jerk slightly increased over left. There is a suggestive Kernig both sides. Grips hand well; right biceps and triceps slightly increases over left. There is found a slight rigidity on forward and backward motion of the head. Tenderness is found on pecussion of skull over right parietal and left mastoid area.

Findings: There seems to be some difference between the right and left side, but it is not sufficiently marked to indicate a definite lesion. The patient is extremely toxic and mentally confused, therefore, co-operation is reduced to a minimum. The history of mastoid infection on the left side with a discharging ear on the same side at the present time plus the indefinite signs on the right side of the body would point to the left cerebrum as the seat of irritation and probable location of any lesion.

Recommendation: Spinal puncture and cell count and if the cells show a predomination of polynuclears it might indicate a meningitis more or less localized. If the cells are lymphocytes you would consider the case a toxic meningitis."

The inference from this report would be that, if any search was to be made it would have to be done on the left side—that is, the previously operated side. To my way of thinking, it appeared the other way around. I felt that if any intracranial involvement took place it would occur rather through the nonoperated side than the one which was operated and cleaned; and, furthermore, the greater flaccidity on the right side which was slightly apparent—I thought more proper to interpret as greater spasticity on the left side, which would more likely be an earlier manifestation than flaccidity in a subcortical cerebral lesion. This assumption later proved to be correct. At any rate, the indications, at present, seem to be to drain the source of infection plus a decompression through the mastoid wound and if nothing definite could be located during the operation, prepare the wound so that at the slightest sign of localization it would be but a few minutes work to search the brain. The previously operated side had a large dural exposure which could also be utilized in case localization took place on the other side.

Accordingly, I did a radical mastoidectomy on the right side, under local anesthesia and found sclerotic bone almost to the bottom of the cavity where considerable softening of the bone, channels of pus, and an extradural collection of pus were found. A large part of the tegmen of the antrum and tympanum was removed as well as the sinus uncapped and considerable bone removed anterior to the sinus over the cerebellum. Outside of the localized meningitis there were no local signs, such as bulging, that would indicate brain

abscess. In the presence of so much local infection I did not feel justified in searching the brain and if nothing were found, open avenues of infection into the brain. I left the wound open and decided to mark time.

Meanwhile the following laboratory work had been done:

Urinalysis: negative. Blood count: leucocytes 11,000, small lymph. 24, large lymph. 2, trans. 1, poly. 73. Spinal fluid globulin present, no leucocytes, R. B. C. present. Positive culture staphylococcus albus. Wassermann negative. The laboratory thought that the presence of staphylococci was a contamination, but the same germ was found twice, subsequently.

The following were the notes made by Dr. Hamlin after the operation.

Aug. 13, 1924. On the day following the operation the patient seemed less confused and more communicative.

Aug. 14. Patient rested comfortably and seemed brighter.

Aug. 15. Another specimen of spinal fluid was obtained, also a blood culture made. The report of this date was staphylococcus albus in the spinal fluid, blood negative. At the time of obtaining the specimen of blood, 25 c.c. of 1 per cent mercurochrome was given intravenously. The patient showed a reaction to the drug as a chill was followed by a rise in temperature and pulse rate with marked diarrhea the following night.

Blood examination: Leucocytes 20,000, small lymphs. 18, large lymphs. 7, trans. 2, poly. 72.

Aug. 17. Patient talking incessantly, hands had to be fastened to keep from pulling on the dressing, asked for water frequently, intake 68 oz.

Aug. 18. I noticed that during his restlessness the pulling on the dressings was chiefly done with right hand. He kicked more with right leg, and there was a decided flaccidity in the previously spastic side, in both arm and leg. I was then convinced that there was subcortical pressure in the temporo-sphenoidal lobe on the right side, that is, the side just operated on. The patient was again taken to the operating room and without any anesthesia the wound was reopened and there was bulging of the temporosphenoidal lobe. Three stabs were made, the last one forward over the tegmen tympani and a gush of bloody, thick pus came out under high pressure. This was drained with a wick of gauze.

From the patient's condition, his progress, the presence of brain abscess and particularly his meningitis, it was apparent that he was hopeless. The report of an occasional success with subarachnoid

irrigation prompted me to institute this measure in hope of even the slightest chance. Surely I could do him no harm.

With the assistance of Dr. Hamlin and Dr. Noble, the resident on our service, I trephined in the right frontal region, entered the cisterna magna through an occiptal-atlantal puncture, while Dr. Noble did a lumbar puncture, and I irrigated with about 100 c.c. sterile Ringer's solution. The solution was kept at body temperature by the nurse in a water bath. In this procedure the technique described by Dr. Eagleton was followed. A specimen of the fluid was sent to the laboratory for culture. Report: Staphylococcus albus a 100 cells per c.m.

Subsequent notes by Dr. Hamlin:

Aug. 19, 1924. Patient appears brighter and recognized visiting physicians, he moves his right arm considerably but his left is quiet, moves both legs frequently. The evening of the 19th the patient was found out of bed standing in the ward. Intake of fluids 44 oz. for the day.

Aug. 20. Patient recognizes attending physicians and his condition seems encouraging. Temperature 101°, pulse 108, respiration 22. Intake of fluids 72 oz. Blood count: erythrocyte 4,280,000, leucocytes 22,150, small lymphs. 15, poly. 85.

Aug. 21. Temperature 101,° pulse 108, respiration 32. Patient's breathing is laborious in type, does not recognize anyone, moves about constantly in bed, muttering in a low voice. In afternoon of same day, temperature 104.6,° pulse 160, respiration 44. Rales increasing throughout chest.

Aug. 22. Patient died, 4:20 a. m. Cause of death, meningitis (staphylococcus albus). All spinal fluid specimens obtained after death were turbid and under pressure. Lowest pulse rate was 58, noted Aug. 15, before murceurochrome was given. Daily remissions of temperature ranging from 98 to 102,° with highest elevation at 6 p. m., until the afternoon before death, when the temperature kept steadily rising, when it reached 104.6° just preceding death.

Pus obtained from brain abcess showed streptococci nonhemolyticus and pyocyaneous.

Spinal fluid injected into guinea pig—report negative for T. B.

Post-mortem: No complete autopsy was made, but Dr. Hamlin enlarged the cranial wounds and found necrosis of the entire temporal bone, which was infiltrated with pus, including the petrous portion. The abscess cavity was as large as a walnut, the brain was softened about the entire region of the temporal bone and the fluid was thick, although not cloudy. The opposite side was negative as far as intracranial complications were concerned.

1717 Pine Street.

OPTIC NEUROPATHY AND SPHENOETHMOID DISEASE.*

Dr. Clifton M. Miller, Richmond, Va.

The literature on sinus disease as a cause of optic nerve disturbances is so voluminous already that necessarily there is great hesitation before one adds further to the subject. However, something may always be learned by a thoughtful consideration of work that has been done and a constant review and discussion of this work may add further knowledge.

The difficulty that we have labored under is that there is almost a complete absence of autopsy reports in this character of cases. It is rather surprising that the connection between nasal pathology and disturbances of the eye functions was not sooner given more attention in this country. In the *American Journal of Ophthalmology* for June, 1887, there is a translation of an article by Ziem, of Danzig, in which he reports visual disturbances as a result of the use of the electro-cautery on the mucosa of the inferior turbinate. The same journal for September, 1895, contains an article by Adolph Alt, in which he refers to this report of Ziem and reports similar cases of his own.

In 1886, Ziem reported cases of restriction of the visual fields as a result of diseases of the nasal accessory sinuses and made the observation that sphenoidal sinus disease produced this condition much more frequently than disease of the antrum. Killian, in 1887, made the same observation. The cases reported by both of them showed gradual improvement of both the visual fields and central vision as a result of draining the affected sinuses. In 1889, Ziem reports a series of seven cases showing similar results.

Had these reports been kept before us an earlier working out of the place of the nasal accessory sinuses as an etiologic factor in eye pathology might have gone forward step by step with our advancement in knowledge of the physiology and anatomy of the nose and the relations of the accessory sinuses to neighboring cavities.

Had this knowledge been worked out many eyes that have lost useful vision would now be functioning and many people would

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have been saved the frequent injections of tuberculin and other agents in the hope that some latent infection would be reached by this method. Much work of a superior kind has been done in the line of determining the place that nasal pathology bears as an etiologic factor in ophthalmic pathology, but much more remains to be done and the more closely the association between the workers in these lines is drawn the more surely and promptly will the results redound to the welfare of mankind. The pathogenesis of glaucoma is still to be worked out and one of its causes will most probably be found in work in this line.

Onodi, in 1908, published the results of his extensive work on the relations of nasal accessory sinuses and the optic nerve, and to this work much of our present advanced knowledge is due. In his very extensive bibliography are found but two or three names of American observers. The valuable contributions to the subject by American investigators having been made since that time. His plates and their accompanying text have much that is valuable to every department of this study. The explanation of the reason for contralateral or bilateral disease of the optic nerve in onesided sinus disease is very impressive and a study of the plates brings the conviction that he is right in his conclusions. In concluding his article he says:

"I wish to make a supplementary statement. I have, in general, called attention to the latent foci and their explorations, but must emphasize that fact that in those cases of sight derangement, in which the oculist cannot confirm the cause, and suspicion of nasal connection exists, even though the finding be negative, it seems well to take explorative measures, and to seek the cause, whether or not the presence of latent foci is suspected. The good success of Schmeigelow and others strengthen us in our belief. I have never failed to use this test in cases given over to our care, and if I was not always successful in locating latent foci, at least I felt nothing had been neglected. I herewith close my clinical observations.

"The casual connection of a onesided, doublesided or contralateral sight impairment and blindness in diseases of the accessory cavities, particularly those of posterior ethmoid cells and sphenoid sinus, is conclusively proven, the anatomic foundation of this theory is sufficiently established by reason of my morphologic findings; they allow of every natural conclusion, without making use of any forced or improbable hypotheses. An exact pathologicoanatomical foundation is still to be created.

"I am convinced that a complete elaboration of this theory would be made possible by exact clinical observations, and through necroscopic investigations, that mutual rhinologic and ophthalmologic researches will close this important and interesting chapter of medicine."

We have proceeded far since this was written but our work has advanced along just the lines pointed out. The work of White is outstanding and his articles are of the greatest importance to anyone who desires to do work in this line. In 1920, he said in *Journal A. M. A.*, "There are various types of accessory sinus blindness, some of which will recover spontaneously, while others will result in permanent loss of vision unless prompt and proper attention is given. Etilogically they are generally divided as: *1*, those due to a direct spreading of the infection to the sheath of the optic nerve; *2*, those due to the toxemia from infection in the sinuses; and *3*, those due to hyperplasia."

Those familiar with the anatomy and pathology of the nasal accessory sinuses can have no doubt of the correctness of his views as to the etiology above given, but there no doubt is sometimes, particularly in the acute cases, a direct choking of the nerve in the optic canal caused by infiltration from the neighboring acutely infected sinus or a phlebitis produced by infection from the sinus which causes swelling of the nerve head. The probability of these two is borne out by the gravity of the prognosis when the size of the optic canal is small, as shown by X-ray plates. It is exceedingly unfortunate that the technique of making the X-ray plates for measuring the size of the optic nerve canal is a very complicated one and few X-ray operators have perfected themselves in it. It is to be hoped that White's technique will very soon be available to all roentgenologists.

In the diagnosis of these cases every means for systemic and local examinations should be used and even then a diagnosis by exclusion has sometimes to be arrived at and what is in reality an exploratory operation performed. A completed serological and physical examination, as well as a most searching history taking is essential. The possibility of a retrobulbar neuritis from a focus of infection far removed, or alcohol, tobacco, quinin or any other drug that may be the cause of amblyopia must be kept constantly in mind. Syphilis here, as in every other organ of the body, is a frequent etiologic factor and may manifest itself either as in active neuroretinitis or in a retrobulbar neuritis with an opthalmoscopic picture that is practically negative.

Woods and Dunn report an analysis of eighty-six cases of optic neoropathies in which syphilis was the cause in 40 per cent of the cases and sinus disease in 12.7 per cent.

They say further, "The acute cases observed secondary to sinus disease all gave the clinical picture of a retrobulbar neuritis without ophthalmoscopic evidence of inflammation or elevation of the papilla". This latter is not the experience of the majority of others who have reported cases, there being frequently observed marked swelling of the optic papilla.

X-ray examination of the sinuses may show involvement, but a negative plate or series of plates taken in six or more different positions of the head does not of necessity rule out the possibility of sinus infection nor decide against operation. The X-ray examina- should include plates showing the sella turcica in order that the size of this may be carefully considered in the neurological examination of the case. Nasal examination may reveal pus in minute amount, a careful tracing of which to its source will lead us to the offending sinus. Every diagnostic means at our command for nasal examination should be utilized. Most frequently shrinkage of the nose with cocain and adrenalin shows no pus or abnormal secretion, but a middle turbinate that will not shrink and is crowded against the septum, which may be deviated high up. This condition is, in the opinion of Skillern, a very suspicious one and should be corrected. That the narrowed condition of the upper region of the nose is upon the oposite side to the optic nerve involvement in unilateral cases is no indication that defective drainage is not responsible for the condition, and this condition must be dealt with as though it were upon the side of the defective eye. The closed condition of the nose may be an indication of sinus disease that has no other symptom that can be discovered by any means of diagnosis now at our disposal. Van der Hoeve says, "The rhinologist cannot say with absolute certainty that a person has no sinus affection". With this statement we, no doubt, all agree.

In the examination of the eye alone factors to aid in the diagnosis may be present or absent. In connection with the ocular examination it must be remembered that intraocular pathology has, in practically every case, its etiologic cause in some location away from the eye. In retrobulbar neuritis and usually in papillitis and optic atrophy the ophthalmologist has no symptom in the eye alone that will allow him to say positively what is the cause of the disturbance in function or abnormal appearance of the nerve head.

In a patient presenting with blurred or decreased vision the ophthalmoscopic examination may or may not show changes in the nerve head where the cause is a sinus disease; such interference with vision, however, is frequently the symptom that causes the patient to seek relief, hence the ophthalmologist is usually the one first consulted. In the absence of any visible signs of optic nerve involvement the symptoms of retrobulbar neuritis are sought.

According to Bordley the most common alteration in the field of vision is an enlargement of the blind spot of Marriott. This enlargement is of spindle form and gradually overspreads a preceding and advancing color scotoma. Narrowing of the field for red is one of the earliest symptoms in the opinion of the majority of observers. Unilateral retrobulbar neuritis points to sinus disease as a cause, but is by no means to be taken as certainly indicating such a cause any more than bilateral involvement indicates the absence of sinus disease. Pain is not characteristic. There may be a typical pain, such as is usually suffered in asthenopia or intense nonlocalized headache, but no characteristic pain is the rule. Careful inquiry into the location, time of onset and character of pain should always be made, but the information elicited by this means will usually not be sufficient to be of real value.

Pain, blurred vision and a semidilated pupil are early symptoms to be given full weight, but the same occur in glaucoma. There is nothing absolutely characteristic of sinus disease as a cause of defective vision to be gotten by examination of the eye alone. The field of vision is the point to be most carefully considered in this part of the examination and variations in the size of the field defects have some significance as well as variations in the visual acuity. It is not unusual for a patient to see more acutely at one examination than another. This is particularly true of the slowly progressing retrobulbar neuritis cases whose vision undergoes marked changes from various extraneous causes, such as changes in atmospheric conditions, or is markedly improved by a free epistaxis. When a patient presents a history in which such statements as the above are contained they must be given due weight and suspicion of the accessory sinuses is strengthened.

The discovery of some other factor such as alcohol, syphilis, etc., as a cause of retrobulbar neuritis does not mean that the sinuses are freed from suspicion, for they may be acting as a contributing cause and the case may not yield to treatment of the apparent cause, in which case the sinuses should receive the same attention as though no other cause had been found.

Conversely, if a diseased sinus is apparent in a case of retrobulbar neuritis or papillitis while the sinus should receive immediate and adequate drainage, still other conditions that may be contributing factors to the optic neuropathy should be sought for and, if found, given appropriate treatment. There should be emphasis put upon this phase, it seems to me, for we are prone to cease further search when a factor sufficient to fully account for the symptoms present is found.

The treatment of these cases does not always involve operation on the sinuses; when the middle turbinate shrinks readily following the application of cocain and adrenalin and no pus is evident after suction, they frequently are cured by a careful regulation of the diet and all the habits of life. There should, at the same time, be local treatment of the nose by shrinkage and suction, followed by the liberal use of argyrol solution, 40 to 120 grs. to the ounce. The 40-gr. solution seems to meet with the approval of many workers in this field. In my own hands the stronger solutions have seemed more effective. The argyrol is not used for any antiseptic effect that it may be supposed to have, but for the detergent effect it undoubtedly has upon engorged mucous membranes. Under such a regimen as that just outlined many of these cases will recover, but they are prone to recur after an attack of grippe or very severe rhinitis and patients should be warned that an operation upon their sinuses may be required at any time for the preservation of vision. Where the middle turbinate will not shrink under the use of cocain and adrenalin and continues tightly in contact with the septum, inadequate aeration and drainage of the ethmoid and sphenoid is to be inferred. In such cases if there is also shown by X-ray films a small optic canal immediate operation is indicated, particularly when the case is one of rapid onset of the blindness with or without ophthalmoscopic evidences of changes in the optic nerve. White's cases show that early operation greatly improves the prognosis. The full and complete examination of the patient and elimination of other causes of optic neuropathy is, of course, essential before deciding upon this course.

The above statement is made in full knowledge of what Cushing has said relative to operating on such cases. His handling of White's paper was even, to his own mind, unfair for he said, "It may be unfair to take random paragraphs from a well intentioned paper," etc. White's attitude toward care in diagnosis and elimination of other causes of the condition under consideration is too well known to allow him to be considered reckless. Rhinologists can scarcely

view with patience such strictures even from a man of such ability as Cushing when he does not hesitate to go into the brain or inflate the ventricles for purposes of diagnosis. Here, as elsewhere, in surgery the work should be done by competent operators, but where all else seems lacking an exploratory operation is frequently indicated, and when so indicated is justified. Such an essential to the welfare and happiness of the individual as vision must be preserved if it is possible to do so. The technique of the operation is too well known from the work of Skillern, Sluder, White and others to need any elaboration at this time. They all emphasize the fact that all that is needed is removal of the middle turbinate, uncapping the posterior ethmoid cells and opening the sphenoid. A complete exenteration of the ethmoid is not necessary. Aeration and drainage is the object sought. At this point the history of three cases may be of interest as they all bear upon different phases of the subject.

Case 1: Mrs. W. G. D., age 48 years; first seen Oct. 23, 1922, complaining of reduced vision and a spot before the left eye. Previous history had no particular significance; had always been strong and healthy; has one grown son. She is now actively engaged in charge of cafeteria for a large firm.

Blood pressure normal, examination of kidneys negative, and Wassermann negative. Fundus of eye showed some optic neuritis in the left side. During the time a thorough physical examination was being made vision gradually became worse until it was reduced to light perception. Examination of the nose showed hyperplasia of left middle turbinate with general ethmoid congestion on this side. It did not shrink under applications of cocain and adrenalin sufficient to give thorough drainage to the nose.

On Nov. 5, left middle turbinate was removed and ethmoid cells uncapped. Following this there was a large amount of mucopurulent secretion, though there was no pus found at the time of operation, ethmoid merely red and soft and the mucous lining of the cells very much swollen. Improvement from this time was gradual, but constant, the optic neuritis in the left eye clearing up slowly until on Feb. 2, with her refraction corrected, vision was 20/20 and has remained so since then.

Case 2: Mrs. J. B. A., age 45 years, seen Dec. 24, 1923, complaining of reduced vision in her right eye and inability to use her eyes for any length of time without severe headaches. She had been repeatedly refracted by competent men without satisfactory result. She had recently had thorough physical examination in a neighboring city with findings all negative.

Examination of her fundus shows no change, nasal examination shows some disease of the right antrum and ethmoid, hyperplasia of the left middle turbinate, which does not shrink under cocain and adrenalin. Suction reveals but little secretion, examination of which shows the presence of the staphylococcus albus.

On Jan. 4, her right antrum was drained, right middle turbinate removed and ethmoid cells uncapped. She made uneventful recovery and on Jan.24 her vision, with correction, was 20/20. With proper glasses it has remained so ever since and she has been able to use her eyes with perfect comfort.

Case 3: Mrs. J. P. L., age 38 years, referred to me Oct. 7, 1924, on account of failing vision, which appeared to be due to her nose. She gave history of vision failing gradually for the past year or more, during which time she had been having nasal treatments, local applications and suction, but this had been of no benefit. The vision at present was light perception in each eye.

She has two healthy children, but about a year ago she was operated on for complete hysterectomy, the cause of this she did not give very clearly. It appeared, from what she said, to be on account of pus tubes. Since this time she has been in fairly good health except for vision. Examination of her nose showed very red and big middle turbinate on the right side, impinging against the septum. This did not shrink on use of cocain and adrenalin, but suction gave no evidence of pus. Ophthalmoscopic examination showed optic nerves somewhat gray in appearance, otherwise nothing noteworthy. Physical examination negative except blood Wassermann showed plus four positive. The administration of salvarsan intravenously brought about a gradual improvement of vision to normal, at the same time the nasal condition improved.

These cases are reported not because there is anything new or startling in the history of any of them, but to illustrate types of the classes of cases that come under our observation. Case 1, showing an ophthalmoscopic picture of papilledema, could be studied with the ophthalmoscope as the vision decreased. While the examination into the neurological, serological and general physical condition was being made the vision gradually decreased until only light perception remained and the edematous appearance of the nerve head with obscuration of its outline became more marked. Following operation the same process in reverse was observed until the nerve head was normal in appearance and vision was normal.

There was no pus found at operation, but the entire posterior ethmoid region was red and congested and the removed material

looked almost like splenic tissue. Through an error culture from it was not obtained.

In Case 2 the difficulty with vision had been going on a long time and numerous attempts to correct the vision by competent ophthalmologists had failed to improve either the vision or the asthenopia. Several weeks stay in a general hospital had failed to help in the diagnosis of her trouble; she had been subjected to all types of examination. Though her vision had been reduced for over a year it returned to normal and the asthenopia was relieved following removal of an impacted middle turbinate and uncapping the posterior ethmoid cells. No pus was found but hyperplasia was present.

This type of case is probably more frequent than is now thought to be the case and a careful search for the cause of reduced and painful vision in eyes that still retain enough visual acuity to be useful would bring to light many cases where nasal abnormality was the cause.

In Case 3 the appearance of the middle turbinate was such that I should have unhesitatingly removed it and opened the posterior ethmoid cells and sphenoid-sinus had not the blood Wassermann been positive. With the positive Wassermann, if the vision had not improved under specific medication and the ethmoid region remained boggy, it would have seemed to me that a portion at least of the pathogenesis of the optic neuropathy was in the sphenoethmoid and they would have been attacked in the hope of saving the vision. The congestion in the top of the nasal chamber as well as the vision cleared up under treatment, consequently no operation was necessary. In conclusion, let me say:

1. That the satisfaction in treating these cases will be greatly enhanced if the rhinologist will himself learn the use of the ophthalmoscope, not for the purpose of usurping the place of the ophthalmologist, but to more intelligently follow the progress of the case in all its details.

2. There is a class of cases of retrobulbar neuritis which seem never to progress to actual complete loss of vision or, at any rate, are very slow in their progress in this direction. These cases are never hopeless from the standpoint of restoration of vision as long as there is no picture shown by the ophthalmoscope of optic nerve atrophy.

3. The finding of one cause sufficient to account for the symptomalogy does not justify us in ceasing to search for all the causes

that may be present and remedy them all in our efforts to restore vision.

4. Where no other cause of an optic neuropathology is found after exhaustive physical, neurological and serological examination has been made, exploratory operation upon the ethmoid and sphenoid is justified in the hands of the competent operator.

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CATARRH OR SINUSITIS.*

Dr. Nathan P. Stauffer, Philadelphia, Pa.

These twelve cases are reported to illustrate the varying symptoms; the difficulties of diagnosing and complications of and the treatment, and some cures of catarrh or sinusitis. Please remember that the word catarrh is the patient's term, not mine.

We find Webster defines catarrh as derived from the Greek, meaning "a run down". So many times we are consulted by our patients for what they term catarrh. Evidently referring to the running nose, or dropping in the throat. Questioning elicits the information there is a constant blowing of the nose, or a dropping in the throat; "a running down".

Naturally the point to be considered is, are we dealing with an acute rhinitis, or a vasomotor rhinitis; or a chronic sinusitis?

If this is an acute rhinitis, it will have a watery or a mucoid discharge, which will change in a few days to a thicker discharge, and clear up under antiseptic washes and proper cleansing sprays of mild oils.

If, however, it is an acute exacerbation of a chronic catarrh, or sinusitis, the mucoid discharge will be tinged with pus, and finally become entirely purulent in character, and this discharge will persist.

It may be blown from the nose so frequently, the patient will use from two to a dozen kerchiefs daily, or it may cause the constant hawking which is so characteristic of a chronic posterior ethmoiditis.

I think we can safely say that any patient who uses several kerchiefs daily after the first two weeks of a cold, or who has the daily dropping in the throat of a thick discharge, can be said to have catarrh, or a better word is sinusitis. It is easier to diagnose in men than women, because ladies frequently are unaware of the postnasal drop and will swallow it.

Indeed they will deny any discharge until a mirror introduced postnasally will bring forth about one-half dram of thick inspissated pus.

Catarrh. To better illustrate the wide variety of symptoms and complications and sequalae, I will present twelve cases. I will not go into all the details of the tests for hearing and treatment, as that is well known to you.

The easiest to diagnose and a common disease is acute sinusitis.

*Read by invitation before the Philadelphia Laryngological Society, Nov. 4, 1924.

Case 1: J. C., age 22 years, white, male, in the midst of an acute rhinitis, was seized during the night with such acute frontal pain, that morphin would not quiet him, so for several nights he suffered, and then was referred to me. I found a badly swollen set of turbinates pressed upon by a deviated septum, both nares filled with glairy mucous and purulent material.

Transillumination gave shadows over both antrum, and no pupillary reflexes. X-ray showed both maxillary cloudy. Patient's parents refused any operation. He was sent to the Presbyterian Hospital, where a blood count revealed 22000 W.B.C. Under ice caps to both antrums, and twice daily dilation of nares with local applications of 5 per cent cocain and 1/1000 adrenalin; accompanied by internal doses of urotropin gr. V.T.I.D., the pain was immediately reduced, so that no morphin was required, and in a week he had recovered; *i. e.,* there is no discharge from nose; absence of pain, no pus; temperature normal; normal blood count. He never had any previous attacks.

Case 2 (see photo No. 1): Quite the contrary was DeW., age 23 years, white, male, single. He had served four years abroad at the front, and while returning home, had an attack of influenza, during which he developed a cellulitis of the right eye. Dr. Holloway was called in consultation by Dr. H. Mac Veagh Brown, and they promptly diagnosed his condition as sinusitis, and had me operate at midnight, urging haste.

I found a swollen and edematous eyelid and pus in the right anterior nares. He was suffering excruciating pain and X-ray showed his right frontals and right maxillary cloudy. Transillumination confirmed this.

I did a modified Killian and a Caldwell Luc, and the patient made a nice recovery in three weeks. About to leave the hospital he developed a septic pneumonia on the right side; then one on the left. This was complicated by empyema and two rib resections. Followed by a pericarditis with effusion and drainage.

Dr. Jopson introduced drainage tubes under local anesthesia into both lungs and pericardium. He was doing nicely until his kidneys refused to function. Death ensued three months after his initial operation for sinusitis. This was the bravest man I have ever seen, although he had all these resection and drainage operations without any anesthetic, with many painful dressings, constantly having three tubes in him, I never heard him make any outcry, or utter any complaint.

Case 3: Another patient, W. G., male, white, age 47 years, was referred to me for deafness and what he termed was catarrh, which he stated "he had had since a boy". This man had no other symptom than catarrh and deafness.

Examination revealed a purulent postnasal discharge, several kerchiefs daily, and he had marked diminution in hearing, in the right ear, that is, same side as his sinusitis.

Transillumination showed a cloudy right antrum and a dark right pupil. At this point, I want to warn you against the weak lights of some transilluminators. Even with a light blonde patient with some weak electric bulbs, you can hardly get a good red pupillary reflex.

Using a strong light, I have found transillumination even more reliable than the X-ray, for I have had X-ray reports which have come back positive only to have a clear puncture. I have never found a dark pupillary reflex without pus. In this man a Myles trocar was introduced under the inferior turbinate (my favorite spot, as I am farther away from the eye) and very foul typical maxillary pus was soon pouring out.

This patient refused operation for a year, and persisted in demanding to be irrigated. It took two irrigations of 1/5000 bichlorid weekly for a year to effect a cure, which treatment markedly improved his hearing. He has not had any discharge for one year.

Patient No. 4 had quite a different set of symptoms.

Case 4 (see photo No. 2): J. W. H., minister, white, male, age 60 years, came from Maine to the medical service, complaining of shingles and leg ulcer. The usual complete routine examination revealed a normal pulse, normal W. B. C. and normal temperature; but a nasal discharge of some years standing, which he described as catarrh. X-ray and transillumination showed left frontal and left maxillary sinuses cloudy, and a modified Killian and Caldwell Luc operation was done.

In a short time he was able to go home cured of his shingles with all their excruciating pain. This man had never suspected his "catarrh" was the foci and the cause of his shingles and leg condition.

Case 5: Another patient, J. M. W., male, white, age 44 years, motorman, came for relief to the Presbyterian Hospital medical service for catarrh and headache. He had normal pulse and temperature, and a normal leucocyte count, normal heart, normal urine. Nasal examination revealed a leftsided nasal discharge. X-ray and transillumination confirmed the diagnosis of frontal and maxillary sinusitis. He was operated upon, Apr. 1, 1918, when a modified Killian and Caldwell Luc operation were done, and on Apr. 13, 1918,

he was discharged cured. For five years he has been free of his catarrh and his headaches.

Case 6: Mrs. B., white woman, was referred by Dr. Chambers, Allentown, June, 1920. This was a grandmother, who was confined to her bed with septic arthritis, and she had had catarrh and headaches for years (using ten kerchiefs daily). Normal pulse and temperature and W.B.C. Transillumination and X-ray showed cloudy frontals and maxillary.

A modified bilateral Killian was done, and a bilateral Caldwell Luc cured her of her arthritis, and she rejoiced in her renewed lease on good health. Examination revealed a purulent discharge still present in her right nostril. A third operation found a central frontal cell which had thick walls on both sides, and which prevented discovery at the original operations, and which had a small communication into the nose.

This was cleaned out, and her recovery was complete. This woman had complete confidence in her surgeon, and submitted to these three severe operations. Otherwise she would still have her catarrh.

It is interesting to note that she developed four years later a kidney condition, for which I referred her to Dr. B. A. Thomas, and she died last year of a septic kidney condition. A further illustration of the harm of permitting these septic sinus lesions to go unoperated upon. For I believe her death was due to a metatasis from her nasal lesion.

Case 7: J. T. Y., age 34 years, male, white, teacher. Hoarseness and attacks of indigestion. Normal pulse, normal temperature, normal W.B.C. and urine and heart. Seldom uses a kerchief, but frequent colds, and a constant clearing of throat postnasally.

A discharge is daily found on the posterior pharyngeal wall, coming from the posterior ethmoiditis and sphenoid region. Refuses operation. Daily irrigation of salt and soda with weekly applications of argyrol 25 per cent, and suction apparatus have relieved him of his indigestion and hoarseness.

Case 8: Prof. B., referred by Dr. F. L. Greenwalt, white, male, age 40 years, married, teacher. Tired all the time, hoarseness, no ambition and use of several kerchiefs daily.

Normal pulse; temperature; W.B.C. and heart, and urine. Examination shows purulent nasal discharge, and transillumination and X-ray show cloudy frontal and maxillary.

Modified Killian cured him of his exhaustion and hoarseness. It is interesting to note in this case that the frontal operation cured the

antrum trouble, still further confirming the opinion that the maxillary antrum was only acting as a reservoir for the pus from the frontal.

Case 9: H. H., male, white, retired banker, age 45 years. Referred from Maryland by Dr. P. L. Travers, because of a nervous breakdown. He had had constantly hawking and blowing of his nose for many years, which had been labeled "the usual catarrh". He has normal pulse, temperature and urine, but could not do any active service, *and was afraid to go anywhere by himself.*

Examination revealed a profuse discharge of pus in his nares, while X-ray and transillumination revealed cloudy antrums. He had been operated upon in New York by Dr. Shamberg for several diseased roots in his superior maxilla.

Under general anesthetic, I did a Caldwell Luc, and this cured him of his nose blowing, and so improved his general condition, that he got rid of his nervousness and also his wife, and he has gone to Europe.

I present tonight *Case 10:* E. J., colored woman, age 60 years, married. Brought to the Presbyterian Hospital complaining of headache, and "feeling funny in the head".

She was supposed to have been cured of a right ethmoiditis years before, as a turbinectomy had been done. She complained of "catarrh".

I found pus in her nares and advised a frontal, as the X-ray showed a cloudy maxillary sinus. She suddenly developed acute mania, and had to be restrained in a straight jacket. Several consultations with Dr. W. E. Hughes were held as to the advisability of operating while in her present condition, as it was feared operation might aggravate it.

After keeping her under observation for a week, and believing her mental condition due to a toxemia, at his earnest solicitation, I did a modified Killian, whereupon her mental condition immediately cleared up. Whether she remains so, remains to be seen. At least she had a very active sinusitis and her mind is clear today, almost a year later.

Case 11: A. V. H., age 65 years, white, male, teacher. Complains of catarrh, inability to breathe through nose, and talks thick and asthma; with postnasal dropping. This patient has many nasal symptoms, yet sinusitis was never diagnosed.

He has a marked purulent nasal discharge with polypii, all probably causing his asthma. He has had two strokes. How much has the chronic sinusitis had to do with causing the weakening and breaking down of his arterial system?

I present tonight *Case 12* — Name, F; age 40 years, is quite the reverse. Here is a patient who never knew he had any nasal condition worth telling, and it was only at close questioning I elicited nasal trouble. His general health has always been excellent, and but one kerchief daily. He had the typical ozeona breath. Normal pulse, normal heart rate, normal respiration, no eye symptoms. Even a frontal sinus operation failed to send his temperature above 100° F., and that only for part of a day, and yet his frontal cells were filled with foul pus.

He went to his physician for an abscess on his forehead which was lanced. It did not heal and a surgeon lanced it again, but Dr. Speese suspected something deeper, and so had me examine his nose. It looked like the typical ozeona, but I found a small amount of pus in each superior nares under the middle turbinate, and thought he had a frontal sinusitis.

This frontal was thought to be only suspicious by the X-ray man but his maxillary was reported cloudy. It was found at operation that nature had been kind to him, and instead of necrosing his internal plate of the frontal bone, it had been burrowed through the thicker right external plate and then crossed and pointed as an abscess over his left frontal about two inches above the right eyebrow. I did a modified Killian on him, and will complete his maxillary later, as he was too cyanotic on the table to finish the operation.

Conclusions: 1 Here are twelve cases with widely varying symptoms. Case 1 had headaches and catarrh. Case 2 had catarrh and eye pain. Case 3 had catarrh and deafness. Case 4 had catarrh and shingles. Case 5 had catarrh and headaches. Case 6 had catarrh and acute arthritis. Case 7 had catarrh and indigestion and hoarseness. Case 8 had catarrh and exhaustion and lack of ambition. Case 9 had catarrh and nervous prostration with various phobias. Case 10 had catarrh and a funny sensation in head which developed into acute mania. Case 11 had catarrh and a closed nose with asthma. Case 12 had catarrh and right frontal abscess pointing on his left frontal bone. All had sinusitis in varying grades, and were either relieved; or cured by proper medical, or operative treatment.

For years their catarrh had been ignored or treated lightly, yet when the sinuses were opened and thoroughly cleansed, the catarrhal symptoms promptly cleared up.

2. Strange how tolerant the heart and temperature were in all these cases to so much pus in the system. Most of the cases had a normal pulse rate, a normal temperature, a normal W. B. C. and a normal respiration, and yet in all of them virulent pus was found and in large quantities.

3. It was peculiar how some had few symptoms, and yet had grave complications, while others had many symptoms, and few complications. It is hard to explain this just on the ground of an acquired immunity.

4. These cases certainly prove catarrh, or sinusitis can be permanently cured.

5. Also that the modified Killian operation cures and leaves the patient as natural as before operation. This does not cause the hideous disfigurement of the radical Killian.

6. Finally it is of extreme importance to question closely the patient, as to all his symptoms and examine thoroughly any nasal complaints in order to cure him.

2015 Walnut Street.

CASE REPORT: PECULIAR CONDITION OF THE UPPER RESPIRATORY TRACT FOLLOWING X-RAY TREATMENT OF CERVICAL ADENITIS.*

Dr. M. C. Myerson, New York.

The following is the report of a case of cervical adenitis which was treated by X-ray and displayed a very stormy and interesting course following the treatment. Whether the child would have been as sick as he was is conjectural. Certainly his local respiratory tract picture must be accounted for by the fact of the X-ray treatment.

R. M., male, age 2½ years, was admitted to the hospital June 19, 1922, and died four days later. He was admitted with a diagnosis of acute pharyngitis and bilateral otitis media. His temperature at this time was 102,° his pulse 100, and respirations 28. The child had had a cervical adenitis of unusual dimensions and had been subjected to X-ray treatment four times within the past two weeks. The last treatment had been given two days before. When seen at home he had an edematous sloughing pharynx. Diphtheria was ex-

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*Department of Laryngology, Kings County Hospital, service of Dr. H. Arrowsmith.

cluded by the consultant and the child was sent to the hospital. Upon admission a thin slough extending from the fossa of Rosenmuller to the posterior pharyngeal wall, uvula, laryngeal structures, and upper trachea was noted. Auscultation revealed a to and fro sound over the trachea, which was evidence of a loose membrane in this structure. There was no evidence of bronchial obstruction. It was advised because of his poor general condition, that the patient be watched closely, with the idea in view of bronchoscopic removal of the membrane, should it become obstructive. The granular, soft, reddened appearance of the mucous membrane was quite unlike diphtheria.

The following day there was evidence of a distinct impairment of transmission of sound through the right main bronchus and evidence of slight transmission of sound through the left bronchus. Some of the slough had evidently accumulated at the tracheal bifurcation, and it was decided to perform bronchoscopy for the removal of the obstruction.

At bronchoscopy the epiglottis was found greatly swollen; it was granulated, edematous, and angry red in color. The arytenoids were similarly involved. The upper half of the trachea was injected; the mucous membrane was thickened and of darker red color. The right main bronchus contained a thick semisolid, viscid, white substance, which was probably disintegrated necrotic membrane. This was removed by suction. The left main bronchus at its tracheal orifice had a similar thick viscid membranous substance flapping to and fro, and partly obstructing its lumen. This was also removed by bronchoscopic suction. There was a distinct improvement in the local respiratory picture after bronchoscopy. The pulmonary sounds had disappeared and the child was breathing much better. On the third day the child became semicomatose, the head was held, rigidly, while the knee jerks were slightly exaggerated. There was a slight Babinsky and Brudjinsky reaction on either side, and a slight Kernig on the left. At this time he began showing signs of a bronchopneumonia. There was beginning evidence of a possible terminal meningitis. The child gradually went into coma and died on the fourth day after admission. The laboratory reports were negative for diphtheria. Direct smears and cultures showed staphylococci, streptococci, and a gram negative bacillus. The spinal fluid on the third day was slightly turbid and under increased pressure. There was an increase of globulin content; 165 polymorphonuclears, and 30 lymphocytes per c.m.m. Wassermann reaction was negative. The colloidal gold curve was indicative of tuberculous meningitis.

An autopsy was obtained. A brief summary of the findings follows:

The mucous membrane of the larynx and trachea was replaced by a light yellowish gray membrane; when washed off, the mucosal surfaces of these structures was somewhat granular. The tonsils, which had been of very large size before the X-ray treatments, were now found to be about the size of a small pea. They could barely be found. The tonsils, pleurae, interstitial lung tissue, liver, kidneys, mesentery, pericranium, meninges and all intracranial structures contained many tubercles. The cervical glands were dissected out; those on the left side were found to be of about normal size; on the right side the glands were slightly larger than normal. On section, these glands showed caseous areas.

From the autopsy it would appear that the mucous membrane of the upper respiratory tract and the tonsils reacted strongly to the X-ray treatment, in addition to the cervical glands, in this case. This was a case of membranous pharyngitis, laryngitis and tracheitis, which followed shortly after the X-ray treatment. Communication with the Roentgenologist who treated the child revealed that the boy was quite ill at the time of his treatment. The Roentgenologist assured that he had used the usual dosage.

This case is not reported as a criticism of X-ray treatment. It is reported, however, to demonstrate that there are individual cases which will not react favorably to X-ray treatment, and therefore great care should be exercised in the selection of these cases for such special treatment. The question arises as to whether the treatment in this case disseminated the tubercle bacilli and caused in addition a peculiar reaction on the part of the mucous membrane of the upper respiratory tract.

30 E. 40th Street.

A PLEA FOR THE MORE GENERAL USE OF LOCAL ANESTHESIA IN TONSILLECTOMY.*

DR. W. HARRY BARNES, Philadelphia.

I was surprised last year to learn that ether is never used by the leading oto-laryngologists of Paris and Bordeaux. I could get no satisfying reason for this. Chloroform is the general anesthetic of the French surgeon. Having had many dangerous experiences with chloroform, in all the operations on the ear, nose and throat, I welcomed the opportunity to learn how they administered it so safely. I will not describe their method here, but the striking fact is that they seldom use a general anesthetic at all. Radical mastoidectomy, radical accessory sinus operations and even total laryngectomy are regularly performed under local anesthesia. I think that their dangerous experiences with their only general anesthetic—chloroform—has compelled them to make their technique of local anesthesia very perfect.

Tonsillectomy in Paris, with a few exceptions, is done under local anesthesia in adults and with *no* anesthesia in children. The children are held in the sitting position by strong orderlies, while the surgeon with a punch forceps (Rualt's) punches out more or less of the tonsils, and scrapes off more or less of the adenoids with a curet. In many adults needing tonsillectomy, they try for months to destroy the tonsils with diathermy, before doing the local tonsillectomy.

Advantages: The *local* operation presents many advantages over the operation under general anesthesia.

1. It makes an operation safe which would be otherwise unsafe: At once we think of patients with diseases of the heart and lungs, in whom a general anesthetic is contraindicated. In this group fall all the tuberculous, who without local anesthesia would be better off with their tonsils, and who bear the local operation well. The same is true of the chronic cardiac cases, muscular and valvular.

2. It makes an operation permissable which would otherwise not be so, such as in case of: hyperthyroidism, nephritis (especially chronic interstitial), uremia, diabetes, hepatic cirrhosis, general debility and lead poisoning. The question of status lymphaticus is as yet unsettled, but the reports of thymic death with general anes-

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thesia far outnumber those with local anesthesia. The same is true of acidosis. It must be remembered, however, that in most of the above conditions, there must be a strong indication for the operation to perform it even under local anesthesia. Such indications would definitely show the tonsils responsible for conditions dangerous to life, or responsible for the condition under consideration (*e. g.*, enlargement of the thyroid from tonsillitis). The judgment of the danger of the following conditions must rest with the surgeon: *a.* recurrent attacks of acute tonsillitis, *b.* chronic tonsillitis causing otitis media, accessory sinus infection, submaxillary adenitis, etc., *c.* chronic tonsillitis with no other cause for endocarditis, arthritis, nephritis, anemia, asthma, etc.

3. It presents a distinct advantage over general anesthesia in the safer performance of the operation, as instanced by the following untoward events: *a.* lung abscesses and postoperative pneumonia were thought to be embolic in origin, but W. F. Moore, of Philadelphia, collected statistics of 200 cases of post-tonsillectomic pulmonary abscess that indicate the aspiration of clots or infective material (quoted from C. Jackson). In local anesthesia, the cough reflex (the watch dog of the lungs) is present and any clots or infective material is immediately coughed up, thus preventing lung abscess and pneumonia from this source. *b.* Hemorrhage. During the operation, blood may escape, and the etherized patient swallow it unnoticed—the first indication of its presence being the vomiting of a large quantity of blood. In local anesthesia the patient always feels the blood, and attempts to expectorate or swallow direct the surgeon's attention to an otherwise unnoticed hemorrhage. *c.* Shock is very much lessened by local anesthesia, so much so that Crile, of Cleveland, uses it often in connection with general anesthesia in general surgery. *d.* The operation is much easier and quicker with the co-operation of the patient, who can raise or lower the head or move it towards one or the other side, open the mouth more or less, expectorate, swallow, etc., all of which helps at times. *e.* All the dangerous conditions, like thymic death, cardiac or respiratory inhibition, etc., have their premonitory phenomena, which in the conscious patient will bring forth some exclamation or movement, which the watchful surgeon will note—thus the respiration and the heart action can be helped before they become weak or cease. *f.* All the unpleasant postoperative effects of the ether are escaped, such as nausea, vomiting, headaches, etc.

4. I have found a large group of patients who will readily undergo the operation under local anesthesia, but who absolutely refuse it

under general anesthesia. It is true that some of these could be persuaded into the general anesthesia, in which case they frequently take it badly and are often shocked. But the most will postpone the operation or refuse it absolutely. The latter class is so ignorant that we are tempted to ignore them and leave them to their fate. But as physicians, we are their custodians and should hold ourselves accountable if any unfortunate termination ensues. The fate of those who postpone it is variable, but conservatively estimated, 25 per cent of them have unfortunate happenings and all are much worse off for the postponement. The local operation in this fourth group should give nearly 100 per cent of perfect cures.

Disadvantages: The disadvantages, for the most part, are imaginary, either from the surgeon's viewpoint or that of the patient. Ignorance of the technique by the surgeon makes him multiply the dangers and hunt up the unusual cases. "Fear is the expression of ignorance" says the old adage. Another surgeon will actually decry a method or an instrument because he is not skillful enough to utilize it, or has had some success with another. When the stethoscope was introduced, the leading internists claimed that the unaided ear was better. If a surgeon cannot perform a tonsillectomy as well under local anesthesia as under general, he does not know the operation well enough to perform it at all.

There is less objection to the local operation by the laity than by the profession, and the many successes of local anesthesia are making the general public demand it rather than fear it. The few patients who object to it claim nervousness or heart trouble. If such really exists, it can be counteracted; and if it cannot is then a *positive* contraindication to a general anesthetic for any operation whatever.

What, then, constitutes the true disadvantages to the operation under local anesthesia?

1. Hypersusceptibility to the anesthetic. This has been the subject of research and study by every scientific body, both here and abroad. The conclusions are so definite and so well known that I will pass them over with only this word. Cocain should never be injected into the tissues. Adrenalin should not be used stronger than 5 drops to 10 c.c. of the solution used: novocain or identical products (procain, etc.) is the safest anesthetic. Its percentage is somewhat important and is dependent upon the condition of the tissues, for instance: 4 per cent may be used if you are sure there is no possibility of entering a vein. It must be understood that I refer only to fresh, potent and properly made solutions of all drugs.

The patient's susceptibility can be measured before the operation by a very simple method. Apply 10 per cent solution of cocain to the nasal mucosa (or any other strength that the surgeon is familiar with). Having examined this mucosa before the application, the surgeon will know absolutely *a.* how the the tissues should react and *b.* that there should be no general reaction, such as acceleration of the pulse and respirations, headache, confusion, twitchings, dilatation of the pupils, fainting, etc. Any general reaction contraindicates the use even of novocain. A local reaction more than twice normal should require further and more careful study before this anesthetic is selected.

2. Hyposusceptibility to the anesthetic. The tests above mentioned will also determine this. Study of the research upon local anesthetics together with the examination of the operative field will determine whether a safe percentage will be sufficiently effective during the time necessary for the operation. In these cases, help is obtained by the internal administration of the bromids, luminal, morphin and scopolamin, if their use is permissibble. Further, the patient may (or may not) be previously told that some slight pain may be expected when the pedicle is severed. (Many interesting studies of the use of very weak anesthetic and nonanesthetic solutions, like sterile water, may be read in the literature.)

3. Obliteration of the landmarks by the anesthetic. This is negligible when a small amount of concentrated anesthetic is used, such as 4 per cent novocain. But as this is not as safe nor as sure, a larger amount of a weak solution (one-half of 1 per cent novocain —1 to 2 ounces) is preferred in my service. The ballooning of the pillars and the tonsilar fossae make it often impossible to use the La Force method with buried tonsils. Even with the dissection method, considerable experience is necessary to be able to distinguish the tonsils from the pillars—the color being the main guide.

Indications: In addition to the usual indications for tonsillectomy, the local operation is indicated in all persons above 14 years of age who will submit to it, but especially in the presence of other diseases which contraindicate a general anesthetic. Among these diseases are enumerated: Tuberculosis and other disease of the lungs (especially emphysema), cardiac disease, both valvular and muscular, nephritis (especially chronic interstitial), diabetes, acidosis, obesity, hepatic cirrhosis, etc.

Contraindications: These include the usual contraindications for: any operation, tonsillectomy, and the true contraindications for the local operation.

1. Some contraindications for any operation are: hemophilia, arteriosclerosis, acute general infections, blood dyscrasias, syphilis, enlarged thymus, mental and nervous diseases (the first mentioned being a *positive* contraindication).

2. Contraindications to tonsillectomy may be grouped as follows: *a*. Acute local infections as lacunar tonsillitis, peritonsilar abscess, stomatitis, postpharyngeal abscess, Vincent's or Ludwig's angina, cervical cellultis, abscess of the cervical lymph nodes, etc. *b*. Anomalous blood vessels: anomalous position of the internal carotid artery, anomalously placed or excessively large ascending pharyngeal artery, very large artery in the anterior pillar, new or misplaced vessels due to previous operations or trauma, etc. *c*. Technical difficulties, such as too small mouths, in children under six months, deformed mouths after burns, trauma, etc., fixation of the tongue by cellulitis, etc., malignant neoplasms anywhere about the mouth, pharynx, larynx, etc. (also a *positive* contraindication), adherent tonsils in seasoned singers who desire a guarantee of the same quality of voice.

3. The true contraindications to the local operation (where the general anesthetic is to be preferred) are: *a*. Children and nervous individuals unwilling or unable to co-operate, in whom the sight of blood, sound of instruments or the feeling of a slight pain would render them unwilling for the completion of the operation. *b*. The aged, or those in whom much hemorrhage is expected. *c*. Where there exists a venous engorgement of the vessels of the head and neck, with the likelihood of getting large quantities of the anesthetic into the blood stream. *d*. Where the patient shows a hypersusceptibility to the cocain group (*positive*).

CONCLUSIONS.

I can say nothing new or original concerning the technique of local or regional anesthesia. I wish, however, to advise those who have not yet successfully used local anesthesia not to study the method noted in some work on throat diseases by a laryngologist. The only safe and satisfactory results can be obtained from studying the works of regional anesthetists, such as Labat in this country, and Canuyt and Rosier abroad.

The disadvantages of local anesthesia in tonsillectomy are practically *nil*, and the advantages of it over general anesthesia are so great that I am sure that when a surgeon once learns to properly apply the local method, the general anesthetic will be used as seldom for tonsillectomy as it is for paracentesis of the tympanic membrane

1315 North 15th Street.

INFECTED TONSILS AS THE CAUSE OF THYROTOXICOSIS.

Dr. H. T. Bailey, Phoenix, Ariz.

When the entire system is surcharged with the products of the thyroid gland, we call the condition thyrotoxicosis. The symptom-complex of Basedow's disease illustrates the condition. While Basedow's disease is a thyrotoxicosis, all thyrotoxicoses are not Basedow's disease.

The tonsils occupy an open position in the throat, that is no food can pass into the stomach, or air into or from the lungs, without passing them. Particles of food and bacteria mixed with mucous will gather on or about the tonsil. This mixture of food, mucous, bacteria, etc., will putrify or degenerate, which forms toxins. This degenerated mass, in turn, lowers the vitality of the tissue where it is lodged, usually the tonsil crypts. With a tonsil crypt spoon, I have excavated and obtained streptococci, staphylococci, pneumococci, catarrhallis, bacillus capsulatis mucosis, Vincent's fusiformis and many others, even almost a pure culture of diphtheria when the patient had never had diphtheria and could not remember of being near a case of diphtheria.

These tonsil crypts may be considered a sump or a catch basin to catch the different offending organisms. These infected crypts inclosing their poison material may be sealed over during any inflammatory process and thus develop a "blind abscess".

It matters not whether the mouths of these crypts are open and exude pus or that they are sealed and have an imbedded abscess, the tonsils are diseased and the toxins are carried into the circulation. It is conceded that these bacteria and toxins cause rheumatism, endocarditis, neuritis, duodinal ulcers and many other systemic disturbances. Why can't it cause thyrotoxicosis? Rosenow has shown that an infection at the root of the teeth has caused a stone in the kidney. Why can't an infected tonsil crypt cause thyrotoxicosis?

The thyroid gland is a manufacturing plant and a storehouse of colloidal material, which is iodin connected to protein, forming a compound called thyroglobulin, the active principle of which is thyroxin. This colloidal material is taken out of the storehouse by

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the lymphatics and circulation and carried to the part of the body where it is needed most; for example, to the nervous system, the vascular system, skin, hair, sexual organs, the osseous system, etc. If there is too much or too little colloidal material manufactured by the gland there will be too much or too little stored in the storehouse, therefore there will be too much or too little absorbed and carried into the system, thus there will be alterations in the aforesaid structures either as an over-stimulation or under-stimulation. It matters not what stimulates the thyroid gland to an over-production of colloidal material, it causes a thyrotoxicosis, and if we have an under-stimulation we have cretinism in the child or myxedema in the adult. The report of the following case will support my contentions:

Mrs. D., age 45 years, was sent to me Oct. 24, 1924. She was very nervous, tremors of the hands, pulse 150, eyes somewhat protruding, palpebral fissure enlarged, ankles swollen. She had been in bed five weeks because of her rapid pulse. About one year ago she began to complain of lack of endurance and rapid heart. Was east and visited a great deal, noticed hands weak and trembled, lost weight from 153 to 125. Blood pressure 150.

Examination shows both lobes of thyroid large, tonsils buried and infected, blood count: red, 4,368,000; white, 6,000. Coagulation time, 6 minutes. Urine, straw, acid, 1012, no sugar or albumin, phosphates, many epithelial cells, small calcium oxalate crystals.

After giving her calcium lactate and consulting her physician as to the condition of her heart, we gave her ether and removed her tonsils by dissection and snare. The right was very large and buried deeply, the left was full of detritis. There was so much in it that we used the sucker to remove it to prevent her from inhaling it. The right bled rather freely, enough that we used a compress for fifteen minutes, after that no bleeding.

Laboratory report on tonsils showed moderate amount of inflammatory infection and fibrotic change. The crypts showed large deposits which have undergone hyalinization and, in places, calcification. The changes represent chronic infection of crypts and some diffuse chronic inflammation.

She remained in the hospital five days, pulse 160 down to 134. Mar. 15, 1925, she was feeling fine, could hardly detect any enlargement of the thyroid gland, no tremors, no Grafe, pulse 80, blood pressure 120-78, weight 144½.

In 1913, Clement F. Thiesen, of Albany, N. Y., published a paper entitled, "Acute Thyroiditis as a Complication of Acute Tonsil-

litis". He was one of the first to point out that acute tonsillitis was the cause of acute thyroiditis which, if repeated a number of times, will in some cases at least cause goiter.

All of Thiesen's patients were young women. A short summary of his cases are as follows:

Case 1: Age 20 years. Sore throat for several days before examination which revealed a typical follicular tonsillitis. Thyroid enlarged and tender on palpation, the hypertrophy increasing during the course of tonsillitis. The swelling of the thyroid had begun during the third day of "sore throat", and the patient stated that the gland was not enlarged before the attack of tonsillitis. Under the usual treatment of tonsillitis, with an ice-coil around the neck, the attack subsided in about one week. Tonsillectomy was refused, and the next winter the patient again presented herself with a similar attack, "running the same course, and again developing with an acute tonsillitis. This patient came to the clinic at regular intervals during the next two years, and while there was no further attack of acute thyroiditis, she developed a gradually increasing diffuse goiter. It is at least possible that etiologically there is a connection between her attack of thyroiditis and the subsequent hypertrophy of the gland. There is no doubt that the infection of the gland was each time caused by the acute tonsillitis."

Case 2: Age 22 years. Same history as preceding case. Patient was practically well in ten days, and was not seen again for about two months, when she came to the clinic with typical symptoms of hyperthyroidism.

Cases 3 and 4: Age 21 and 24 years. Both stated that before the present attack they had had no enlargement of the thyroid. One patient was just getting over a severe attack of acute tonsillitis, and the other was still having an acute attack.

Case 6: Age 19 years. Very severe acute tonsillitis, which was followed by the development of acute thyroiditis. The attack ran the usual course and a year later another acute thyroiditis came on with an acute follicular tonsillitis. This patient has been under observation continuously, and has developed a well marked diffuse goiter, which started about six months after her last attack of thyroiditis.

Case 7: Age 30 years. A very severe acute thyroiditis came on directly after an acute tonsillitis. "There was a good deal of dyspnea and dysphagia in this case, and within a few months after the attack she developed a typical condition of hyperthyroidism."

It seems reasonable to suppose that recurring attacks of tonsillitis might involve a thyroid, and eventually set up a chronic condition of hyperthyroidism, even if the thyroid symptoms were never sufficiently acute to be differentiated during the tonsillitis attack.

Louis E. Brown, of Akron, Ohio, has probably done more work on the relation of tonsilar infection and thyrotoxicosis than anyone else. He not only studied his own patients but prepared a questionnaire which he sent to twenty-eight physicians. These included internists, surgeons, and ear, nose and throat men, the idea being to get a broad range of opinions. The questionnaire was as follows:

1. How many cases of goiter have you had in your practice, in which according to the patient's history, the symptoms accompanying the goiter were apparently temporarily increased during the attack of tonsillitis?

He received thirteen positive replies from such men as David Marine, Plummer, of Mayo Clinic, and Allan Graham.

2. In how many cases, were adults presented in early stages of goiter, was the growth of the goiter apparently arrested by the removal of the tonsils?

All the replies to the question were affirmative. They came from Crile, H. G. Sloan, of Cleveland, Albert J. Ochsner, O. P. Kimball and such men.

3. How many cases after thyroidectomy, in which the symptoms persisted were relieved by tonsillectomy?

Dr. J. A. Stucky, of Lexington, Ky., had seen seven such cases.

4. How many cases of young girls at puberty, who have a beginning simple goiter, had their tonsils removed in early childhood, or at least before the symptoms of goiter were evident?

Most of the answers to this "fell down", "No data" was the reply.

5. In those who have had their tonsils removed, how many were benefitted or cured by tonsillectomy?

All who answered this believed by removing an infected tonsil in an adolescent girl who had a goiter would have a beneficial effect on the thyroid condition.

Dr. Brown said, a number of patients where a thyroidectomy did not relieve the toxic goiter symptoms were not relieved until infected tonsils had been removed. A few cases seen where a tonsillectomy had been done and a small piece of infected tonsil was left the toxic goiter symptoms remained until this infected tissue was removed.

Dr. G. B. Wood, of Philadelphia, recorded a case of a trained nurse, who had recurring tonsillitis followed by exophthalmic goiter

and hyperthyroidism. After removal of the tonsils the attacks stopped for six months, the goiter began to decrease in size and the exophthalmos to disappear. Then followed a sore throat and symptoms of hyperthyroidism. At this time it was found that a small piece of the tonsil had been left. That was removed and all the symptoms of hyperthyroidism disappeared.

Shambaugh, of Chicago, under whom I have studied, warned us to look out for chronic buried abscesses where the patient does not complain of "sore throat". I have taken out tonsils where the abscess occupied half of the base of the tonsil. Many times in children I have found so much detritis buried that I would stop operating long enough to suck this poisonous material out of the throat pulmonary abscess.

Dr. Joseph Beck, of Chicago, in whose clinic I have worked, believes it much better to do a tonsillectomy than to ligate the superior thyroid artery as a preliminary step to thyroidectomy.

Dr. S. P. Beeber, of New York, after examining 3500 cases of thyrotoxicosis, says that 35 to 40 per cent of patients between 16 to 24 who have hyperthyroidism give a history of repeated attacks of tonsillitis.

Many patients with Basedow's disease with their early headaches for fear the patient would inhale it into the lungs and cause a come to the ear, nose and throat man first. It is for him to exclude eye troubles and sinusitis. Then, after examining the tonsils and larynx, he should always examine the thyroid.

Men doing thyroid work should always examine the tonsils.

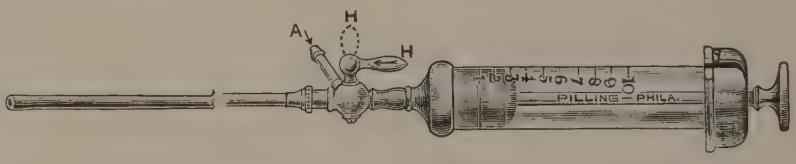
The object of this paper is to stimulate interest in this subject and if need be to invite criticism and opposition which will arouse more widespread consideration of the entire subject.

BRONCHOSCOPIC SYRINGE.*

Dr. Robert M. Lukens, Philadelphia.

In bronchoscopic treatment of disease of the lung and also in experimental work upon animals it is necessary at times to inject fluids into the bronchi by means of a syringe with a long cannula. Necessarily a certain amount of the fluid will remain in the cannula after the plunger of the syringe is pushed home. When large quantities of fluid are being used comparative accuracy is not necessary and the retained amount is of no moment; but where small amounts, such as graded doses in experiments upon animals, requiring cannulae of 60 c.m. lengths or longer, the quantity remaining in the cannula renders accuracy uncertain.

This can be overcome in two ways. First, by dilution, *e. g.*, increasing the bulk of the fluid; second, by blowing the retained fluid out of the cannula into the bronchus.



Dilution is not practical because of easè with which the increased amount of fluid can be expelled from the bronchus by cough.

The difficulty in blowing the smaller quantities out of the cannula into the bronchus lies in removing the syringe in order to fill it (the syringe) with air. Often when the syringe is removed the patient or the animal, as the case may be, coughs and blows the solution back into the air.

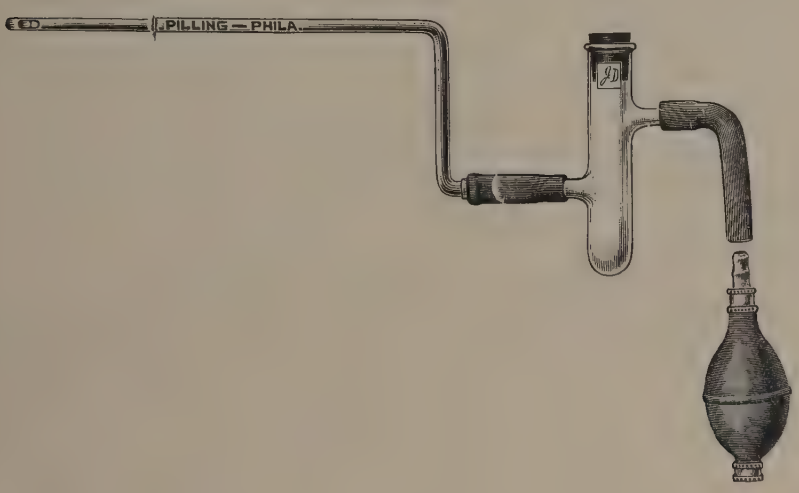
To obviate this I have placed a two-way valve with a quarter turn at the syringe end of the cannula to retain the fluid in the cannula by closing the entrance and opening an air intake hole while the syringe plunger is being pulled back. The air intake hole is then closed and the cannula opened by turning the valve to its original position and the air forced through, carrying the retained fluid into the bronchus.

*Read before the Philadelphia Laryngological Society, Oct. 16, 1924.

BRONCHOSCOPIC SPECIMEN COLLECTOR.*

Dr. Robert M. Lukens, Philadelphia.

This is an instrument for collecting specimens of secretion or pus from the bronchi in diseases of the lung. It is simply a test tube, with an intake arm and exhaust arm, which is interposed between a bronchoscopic suction tube and a suction pump. The collector intercepts the pus or secretion on its journey from the bronchus to the



suction pump. The collector is then removed with the short rubber tubing attached. The free end of the rubber tubing is then slipped over the opposite arm of the collector, thereby sealing it and the specimen is ready for transportation to the laboratory for bacteriological study and the preparation of vaccine.

The whole apparatus is sterilized by boiling. Where there is only a minute quantity of secretion or pus, this collector cannot be used because of its size. In these cases the Clerf collector is to be used.

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*Read before the Philadelphia Laryngological Society, Oct. 16, 1924.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

May 8, 1925.

Paper: **A New Artificial Ear Drum.** Dr. Harold J. Isaacs (by invitation).

Meningitis Complicating Acute Mastoiditis in a Diabetic. Dr. William Siegmeister.

Mrs. S. G., age 50 years, came to the writer's office on Aug. 6, 1924, complaining of pain in right ear for past two weeks, following cold in head. Past history: diabetes for six years, having been under doctor's care all the time; for past six months has been sugar free. Satus presence: rather obese, good color, apparently in good health.

Ear examination: left ear negative; right ear drum membrane red, bulging, all landmarks gone, slight tenderness over mastoid tip, hearing much impaired.

Diagnosis: O.M.P.A. Paricentosis done, free pus found. Patient has been coming to the office for treatment for two weeks, during which time she felt comfortable, pulse and temperature (taken every three hours) normal, except for moderate pain in the ear at night and profuse discharge from the ear. Urine examination showed glucose, 0.5, and the last examination showed albumin and the presence of acetone.

Repeated radiographs showed infiltration of right mastoid but intercellular supta could be distinctly discerned.

The writer had her admitted to the hospital on Aug. 20, 1924, for operation. He did not deem it advisable to operate in the presence of glycosuria and acetonsuria, so he ordered a complete examination of twenty-four hours' specimen of urine and blood chemistry with view of putting her on a course of insulin treatments to make her sugar and acetone free to be fit for operation. On Aug. 21, midnight, patient suddenly became delirious, temperature rose to 104,° has been delirious all night; on the next morning when seen, patient was unconscious, showed a facial paralysis on the right side, rigidity of neck, lumbar puncture showed cloudy fluid, pressure normal, on examination, 5600 cells, most of which were polymorphic nuclear leucocytes. She was operated on by the writer the same day. Operative findings: Mastoid mixed type, mostly diploic, some pneumatic cells; there was free pus in region of antrum, and posterior to the sinus. Dura was exposed. Most of the cells that were there were intact. Diagnosis: Acute mastoiditis, coalescent type, which didn't coalesce completely. Patient did not rely after the operation. Expired at 2 a. m., Aug. 24.

Analyzing this case, the question comes up of the advisability of operating early in diabetics, in the presence of glycosuria and acetosuria. We are all loath to operate on diabetics unless there is an absolute indication. Taking this case, if the patient were not a diabetic the writer believes that most otologists would not have operated, with such a clinical picture and X-ray findings. The operative findings showed that we were dealing with a coalescent type of mastoiditis before coalescence took place. We usually wait with the operation until after the fifth or sixth week, to give nature a chance to localize the infection. In the presence of glycosuria and acetosuria, the writer thought there was an absolute indication for waiting, having such a valuable remedy as insulin at our command, which accomplishes the expected results in such a short time. Yet, the results proved that he was entirely wrong. Possibly, if the patient had been operated on a few days before, she might have escaped the complicating meningitis, and might have had a chance of recovery from her mastoiditis.

Acute Suppurative Labyrinthitis in Diabetic. Dr. William Siegmeister.

Mrs. R. T., age 50 years, came to my office, Mar. 8, 1925; referred by Dr. M. Clurman.

Chief complaint: Running ear for past four weeks.

Family history: Father and mother had diabetes; recently a brother died from some malady.

Past history: Had diabetes for past sixteen years; subject to frequent attacks of diarrhea.

Has ten children, all living and well. Emphatically denied any previous ear trouble.

Present illness: About four weeks ago had an attack of tonsillitis, which was followed by earache, headache and dizziness on left side. A few days after left drum membrane ruptured, followed by sanguinopurulent discharge. Pain in the ear was relieved immediately. She had been treated by her family physician since. Feeling comfortable, except for occasional headaches and dizziness.

Physical examination: Left ear: profuse discharge, large central anterior, inferior perforation of membrana tympani discharge reappearing immediately after being wiped away. Slight sagging of posterior superior canal wall, slight tenderness over mastoid. Right ear, nose and throat, negative.

Functional examination: Hearing in right ear normal. Left ear (with the use of noise apparatus) entirely gone, for voice whisper and all tuning forks. Weber was still lateralized to the left.

Neurological examination: Spontaneous rotary nystagmus to right side, otherwise negative, reflexes normal. Pupils and pupillary reactions normal.

Labyrinthine examination: Douching left ear for four minutes with hot water at 110° F. No nystagmus to left, nystagmus to right persisted, no nausea, vertigo or falling, no past pointing. Douching of right ear with cold water at 68,° nystagmus to left, falling to right. Past pointing to right, nausea being present. Fistula test negative. From above examination dianosis of acute mastoiditis, complicated by acute diffuse suppurative labyrinthitis was made and patient referred to hospital. Examination on admission: Temp. 98, pulse 84, urine SP. Gr. 1026 albumin ++, glucose 2.5, acetone, diacetic acid plus, plus. Blood examination, R.B.C. 4,000,000, Hb. 78 per cent, W.B.C. 10,200, polys, 79 per cent. Bl. sug. 250. Lumbar puncture; pressure increased 4000, cells prm. polys. 90 per cent. No organism and direct smear found.

Mar. 9: Patient comfortable, at 12 M. Temperature rose to 103.2,° 4 p. m., 104.° She was operated on at 5 p. m.

Operative findings: Local anesthesia, radical mastoid done. Entire body of mastoid found necrotic, filled with pus. Sinus found exposed, dura of middle fossa exposed. No labyrinthine fistula found. Condition after operation did not improve. Temperature persisted. Two days after she developed convulsions. Exitus on Mar. 14, 1925. A part of the labyrinth was removed. Post-mortem. The pathological report is as follows: Sections of this tissue show varying stages of inflammation. Some areas show an acute exudative inflammation characterized by moderate absorption of the bone tissue with invasion of all types of inflammatory cells. Other sections show presence of granulation tissue composed of collagenous fibrils, young fibroblasts, small round plasma and polynuclear cells. This tissue is non-specific in character. This case shows following points of interest:

1. Acute, suppurative, diffuse labyrinthitis occurring in an acute otitis.

2. Patient suffering from acute, diffuse, suppurative labyrinthitis without any classical symptoms. There was no nausea, vomiting, vertigo or atasia.

3. Question of labyrinthectomy is up for discussion, there being all the signs of a dead labyrinth with threatening meningitis, it was my opinion that the labyrinth should have been opened or exenterated.

Dr. Kopetzky did not agree with me. I would like to hear your opinion on the question.

DISCUSSION.

Dr. M. L. Harris said that in the case reported by Dr. A. A. Schwartz he had been the first to see the patient, who came to him with an abscess of the septum, which he incised; three days later she developed an otitis media, and four days after that was admitted to the hospital.

Paper: **A Report of Three Cases of Primary Acute Mastoiditis.** Dr. Samuel J. Kopetzky and Dr. Ralph Almour.

Paper: **Two Cases of Primary Jugular Bulb Thrombosis, Not in Infants.** Dr. William Ginsberg.

Acute Mastoiditis with Complicating Facial Paralysis; Recovery After Operation. Dr. A. Greenstein.

This case is not reported on account of its rarity, but rather to bring home to the otologist once more the fact that facial paralysis occurs as a complication in acute mastoiditis.

There is no need, at this time, to go into the details of the causes of facial paralysis; suffice it to say that it can occur due to extension of inflammation along the course of the facial nerve, whether in the facial canal, in the internal auditory meatus or as a result of bone destruction within the mastoid itself.

The degree of facial paralysis varies, depending upon the extent of the inflammation, whether the entire or only certain bundles in the nerve are affected.

While the paralysis may be caused by lesions of the nerve located centrally, during its course through the Fallopian canal, or peripherally, it is desired in this report to consider it only in its connection with an acute mastoiditis.

D. C., age 9 years, two days after surf bathing, on July 30, 1924, patient complained of pain in right ear, slight cough and fever; after several hot ear irrigations the pain subsided.

A week later, on Aug. 7, 1924, I was called in to see the patient. She again complained of pain in the right ear. A right sided facial paralysis was noted, involving the upper branches of the facial nerve. There was no loss of sense of taste. Temp. 101° F.

On physical examination a bulging drum was found, dark red in color, with all the landmarks and light reflex gone. There was no headache, vertigo, or nystagmus. Myringotomy was performed.

The next day the patient still complained of pain in the ear; there was only a small amount of purulent discharge, although the tympanic membrane was widely opened. She complained at this time of some tenderness over the mastoid tip, but not over the antrum. Hearing in the right ear was somewhat reduced, but did not lateralize.

X-ray examination showed clouding of the mastoid along the posterior wall and tip.

Blood examination: white cells, 14,000, with 73 per cent polys.

Examination of the ear on this day showed some sagging of the post-superior canal wall.

In view of the fact that this patient had a facial paralysis, although the mastoid symptoms were not marked, it was deemed advisable to perform a mastoid operation.

On Sept. 9, 1924, the usual mastoid operation was performed. The cells were broken down and filled with a large amount of thick, greenish purulent material. The sinus wall was diseased and the sinus on being exposed appeared normal. Acqueductus Fallopii also appeared normal. The wound was packed and dressing applied.

A few days after the operation the facial paralysis began to show signs of improvement so that on Sept. 18, 1924, the patient was able to wrinkle her forehead and partly close the eye. The middle ear be-

came dry by the third week and the mastoid wound healed in five weeks, during which time the paralysis continually improved and when discharged had completely disappeared.

In differentiating this condition from other cause of facial paralysis, the most important one is the idiopathic Bell's palsy. In view of the fact that this paralysis began to improve immediately after the mastoid operation, it is only fair to assume that necrosis of the mastoid bone was the cause of the facial paralysis in this case.

DISCUSSION.

DR. WM. SIEGMEISTER, referring to the diabetic cases, said he had had a number of cases with middle ear infection in diabetics which have recovered, but these cases had given him a great shock. the first being only two weeks old and the patient being in such apparent good condition. She was admitted for operation only because she was a diabetic, and it was just one day too late.

In the second case, about the labyrinthitis, there was some misunderstanding in the discussion. It was not a case of labyrinth examination. Examination of the labyrinth showed an absolutely dead labyrinth; it did not respond to any of the tests; there was no hearing whatever. Dr. Kopetzky was in doubt as to whether the infection in the labyrinth was from the middle ear, or from meningitis, and he thought she had meningitis, from the spinal fluid report. When the patient was first examined by Dr. Siegmeister she lateralized to the left, showing that the labyrinth had some function left; on the next day she lateralized to the right; from that it would seem that the infection traveled from without inside, and that the meningitis was secondary, etc.

Paper: **Case of Acute Mastoiditis with Meningitis. Temporosphenoidal Abscess Discovered at Post-Mortem.** Dr. J. M. Polisar.

Paper: **Temporosphenoidal Abscess and Mastoiditis of Doubtful Origin.** Dr. William Siegmeister.

DR. KOPETZKY said that the first series of cases reported, namely, those complicated by diabetes, brought home the fact that neither the general practioners nor many otologists seem to realize that the diabetic condition modifies and controls the clinical picture, and that the factors which one ordinarily looks for in the development of mastoiditis are clouded by the underlying constitutional trouble. These cases frequently run a seemingly inocuous course, until a point is reached when they present a more pronounced clinical picture. At that time, they have frequently passed beyond the stage where effective surgery can be employed; and the surgeon is face to face with intracranial complications. This is exactly what happened in the cases reported.

Dr. Kopetzky spoke of a case which he had recently operated upon. It had been under observation for over four weeks and then suddenly developed a large abscess in the neck, extending down to the clavicle. The medical attendants on that case were amazed, at operation, by the extent of the process which had developed under their very eyes, without their having appreciated what was happening.

Dr. Kopetzky said that while diabetic patients present neuritides generally, when it comes to the mastoid the constitutional trouble seems to be anesthetizing and the patients do not as a rule complain of pain, either spontaneously or upon pressure. On the whole, one cannot judge a diabetic mastoid by the criteria employed in the average case.

In the case presented by Dr. Schwartz, in addition to the unusual finding of a streptococcus mucosus capsulatus in the blood, there was the element of diabetes. The patient had been watched and studied by competent observers; and yet, as the story shows, the clinical picture was again misjudged because of the underlying constitutional disease. According to Dr. Kopetzky, the diabetic patient who has an ear infection which does not promptly resolve and show signs of healing should be operated upon.

Roentgenological examination helps greatly in these cases and should be performed repeatedly so that any progressive changes in the bone

may be noted. Destruction in the bone can be studied in this way unless there is a scrolosis of the bone present. The latter condition is readily established by comparison with the condition in the opposite ear, because usually one finds the same type of mastoid process on both sides.

It is to be stressed that Dr. Schwartz' case presented as a predominating symptom frontal headache and headache localized more or less on the affected side of the head. Headache which is fairly intense on the side on which mastoid operation has been performed is very suggestive of sinus thrombosis.

The cases presented by Dr. Almour are exceedingly interesting. The first case we studied from its very commencement, and it developed under our eyes. It was very difficult to believe that a mastoid was developing in that case, for our daily examinations of the middle ear never showed any signs of trouble which could be noted as abnormal. The case of sinus thrombosis for which we did not operate, and which occurred in a case of primary mastoiditis, was in the care of physicians other than ourselves at its inception. The report was given us that the child had had erysipelas, following which the temperature became normal, and that the mastoiditis developed subsequently. At operation, when the sinus was exposed, we found an organized clot; the vein was firm and hard and showed no pulsations. The child had a flat temperature at the time and ran none subsequently. Dr. Kopetzky thought that the child had had, not an erysipelas, but a sepsis due to a sinus thrombosis, and that the indefinite rash described by the medical attendants was really a rash due to streptococcus infection. Of course there can be no proof of this; but the subsequent course of the case would seem to verify it. Time passed, the clot was organized, and there was no systemic nor other reason to disturb it. Unfortunately, a month or so later the child died of acute nephritis, after she had been discharged from our care.

In the case of primary bulb thrombosis reported by Dr. Ginsberg, the diagnostic picture was confused in the beginning because of the suspected pulmonary condition; and the man who operated could hardly be blamed for going at it half-heartedly. He said that he found nothing on opening up. This case presented to Dr. Kopetzky's mind all the symptoms of a sinus thrombosis; but although he persisted in his diagnosis, he could not get the support of the rest of the staff on it, and the family refused permission to operate. Later, when permission was granted, the thrombosis was established to the satisfaction of everybody. Dr. Kopetzky holds that where a case presents a running ear and a sepsis with a positive blood culture not explicable by any lesion elsewhere in the body, one should always suspect a sinus thrombosis, whether the patient be an infant or an adult. No one has yet estimated the number of times in young adults where there is a bone dehiscence between the floor of the tympanum and the dome of the jugular bulb. Some years ago Dr. Kopetzky figured this roughly as happening in eight out of twenty-five specimens. In the majority of cases in a general hospital, these patients come in with secondary lesions and the sepsis due to the secondary lesion overshadows the primary focus in the lateral sinus. The case should really be treated before the secondary lesion develops.

Dr. Polisar's first case was interesting, Dr. Kopetzky said, because he had never before seen a multiple temporosphenoidal abscess accompanying a thrombosis, as here. When Dr. Kopetzky first saw the child, it was sitting up and no one could conceive that it had a brain abscess. All that Dr. Kopetzky found was a sluggish reaction to light in the right pupil and an ankle clonus; and he advised a lumbar puncture and hospitalization. It was very hard to make the child's parents agree to this in view of its apparently good condition at the time of consultation. The diagnosis was established upon lumbar puncture. Dr. Polisar had suspected a brain abscess, but Dr. Kopetzky could not agree to that diagnosis in view of the facts that he then had at his dospisition. When

the child was operated upon for drainage of the cisterna magna, it was found that the fluid did not come out with the usual gush and did not seem under great pressure. Then, for the first time, the operator was doubtful as to the condition for which he was operating. However, the child, who was operated without anesthesia, as obviously moribund; and the surgery was undertaken as a last hope. Autopsy revealed an erosion of the dura near another erosion found in the tegmen antri which had not been noted by the original operator at the original mastoidectomy. Autopsy revealed not only these erosions, but a brain abscess with a lining, delimiting membrane. In view of these findings, Dr. Kopetzky doubted whether the child could have been saved in any event; but the case demonstrates how large a collection of pus can be carried around without destroying the patient's complete control of all his faculties.

In regard to the finding of granulations on the dura in the middle cranial fossa at an original mastoidectomy, the question arises as to whether they should or should not be disturbed, whether the operator should consider them as a protective barrier and leave them alone, or search through them for possible fistulae leading intradurally. Dr. Kopetzky holds the following. If an extradural abscess is found at original mastoidectomy in a patient who presents no signs nor symptoms of an intracranial nature, neither headaches nor focal signs, then granulations found on the dura of the middle cranial fossa should be left intact. If, on the other hand, the patient shows signs of meningeal irritation,—localized headache or focal signs due to pressure—then one is justified in suspecting that these granulations are but the outer covering of an intradural or brain abscess, and one should not leave them intact. Had the case which Dr. Siegmeister reported, and which presented granulations in the middle cranial fossa in conjunction with intracranial symptoms, been probed, the intradural and brain abscess would have been uncovered. In view of the grave condition of the patient, it is doubtful whether this would have affected the outcome of the case; but at any rate a full diagnosis *intra vitam* would have been made.

Finally, in the question which was raised by Dr. Siegmeister as to whether or not one should remove a dead labyrinth in a case of meningitis, Dr. Kopetzky holds that it is better to drain the meninges than to prolong the procedure and operate on the labyrinth **first.**

Dr. Chambers said that when he looked at the menu of entertainment for the evening he was impressed by the fact that eight speakers were on the list "by invitation". He recalled the time when there was no Section on Otology, and he felt that this was the first time in the history of the Section when such a rich programme was presented from the outside. So rich a programme of such beautiful cases so beautifully presented was a great treat, and Dr. Kopetzky was to be congratulated on his staff; it must be wonderful to have such a class of boys.

In speaking of his artificial drum, Dr. Isaacs had stated that it required the use of the speculum, to place the cotton properly, to stop the tinnitus and relieve the deafness. Dr. Chambers said that he had had many patients who were in the habit of putting a little ball of cotton in the ear themselves, and he had found that they could do it better than he. They never used anything but dry cotton, and it seemed to serve for a long time.

Dr. Maybaum said that only words of commendation should be given the men who presented these interesting and instructive cases of otitic complications. As he listened to the reports, he could only conclude that the trials and tribulations of an otologist in one institute resemble very much those of men in other institutions.

The question of operative interference in cases of acute mastoiditis complicated by an acute suppurative labyrinthitis is one of the difficult problems which occasionally presents itself for decision to the otologist. In general he believed that operative interference upon the mastoid should be delayed as long as possible. Repeated examination

of the spinal fluid, close observation of the course of the disease, will aid in determining the question for or against a labyrinthectomy.

The case of sinus thrombosis reported by Dr. Schwartz is extremely interesting. He not only had a diabetis to deal with, but also a streptococcus mucosus infection. Dr. Schwartz referred to the symptom of early headache in this case of sinus thrombosis. Dr. Maybaum does not believe that headache is a common symptom of an uncomplicated sinus thrombosis. In the case reported by Dr. Schwartz, the characteristic headache of a Gasserian ganglion involvement seemed to be a prominent symptom; such headaches he had seen in quite a few cases of mucosus infection involving the petrous portion of the temporal with extension to the Gasserian ganglion.

As for the three cases of primary acute mastoiditis presented by Dr. William Ginsberg, even though the history of the onset of these cases may be very vague or apparently absent, something of an inflammatory nature had taken place in the middle ear. Careful inspection of the tympanic membrane usually discloses some change of a more or less minor nature. The drums are not absolutely normal. Some thickening or dulling of the landmarks may be the only signs of previous middle ear in volvement. Nothing was said in the report of these three cases of so-called primary mastoiditis, as to the type of infection cultured from the mastoids.

The cases of primary jugular bulb thrombosis presented by Dr. Ginsberg are worthy of comment. The diagnosis of primary jugular thrombosis can be one of the most difficult in otology, unless the signs and symptoms are quite definite. One should not be too hasty in making this diagnosis; having made such a diagnosis, definite action must necessarily be taken. The presence of a discharging middle ear without mastoid involvement, a streptococcic bacteremia, early ocular fundus changes—papillitis—enlarged tender glands at the angle of the jaw point quite definitely to a primary jugular bulb thrombosis. In some of these cases of primary jugular bulb thrombosis which we observed in Dr. Friesner's service at Mt. Sinai Hospital the ear had never discharged.

Dr. Maybaum believed that clinical meetings such as those should be held with even greater frequency, as the benefit resulting from the exchange of views and experiences is invaluable.

DR. GINSBERG: Dr. Maybaum understood me to say that a choked disc was present on admission and that a diagnosis of primary jugular thrombosis could have been made therefrom. I corrected him by saying that there was no evidence of any papillitis or choked disc on admission; that the choked disc did not appear until four weeks after admission and persisted for six weeks, after which it began to recede.

DR. LEDERMAN said that in diabetics, unless the indications were exceedingly urgent, surgery should be held in abeyance. He is inclined to look upon diabetes involving the ear with a great deal of trepidation and feels that unless one can be reasonably sure that the subjective symptoms are due to the collection of pus, it is good judgment to watch such cases and treat them symptomatically. Simply because a diabetic has an otitis, with no pain, is not an indication for going into the mastoid. Six weeks ago, the mother of a physician developed an otitis following influenza. When first seen there was no question of draining the middle ear, as there was decided bulging of the drums and tenderness over the mastoid tip and antrum. She did very well for a few days and was given insulin in anticipation of the possibility of surgery. The objective symptoms were not very satisfactory, the swelling of the membrana tympani did not go down very promptly and drainage was very profuse. The insulin was continued, however, and simple suction was employed in a gentle manner, plus the dry treatment with iodin powder, and in that case although sugar was present and disappeared under the insulin treatment, it returned when same was omitted. The mastoid tenderness did not disappear very rapidly and the secretion continued for four weeks, with the prominence of the ear

drum. It required fortitude to practice masterly inactivity, but the condition subsided without surgery. That was an illustration that when a patient has diabetes and rather suggestive clinical symptoms of mastoid disease, it is not necessarily an indication for operation. Such cases are very poor surgical risks.

Dr. Lederman then told of another case, a woman age 56 years who had been under the care of a colleague who was taken ill. He had been asked to take charge of the case for the time, and did not think it was one which required immediate operation, although he felt that the mastoid was involved, but the ear was draining and there were no retention symptoms. He suggested that another colleague see the case and this man advised against operation; but a third man who was called in urged operation and his advice was followed and he operated, and the patient promptly developed coma and died.

Dr. Lederman said he had seen other cases of diabetics with suppuration of the nasal sinuses that got well under palliative treatment, and he could not be too emphatic about operating on these patients without proper consideration of all factors.

He did not recall seeing an acute mastoiditis without some middle ear involvement, and he did not know of any case where he would say it was an acute mastoiditis *per se*. He agreed with Dr. Friesner and others that there had been some previous infection with an occlusion of the aditus ad antrum.

Referring to kidney involvement associated with acute conditions of the middle ear, Dr. Lederman said he had seen a number of cases where the kidney condition was present at the time of a middle ear involvement and when the middle ear improved the kidney condition improved also, showing that undoubtedly there was some connection. He also agreed with Dr. Maybaum that in the presence of an acute mastoiditis with labyrinth symptoms, he would not be tempted to open the labyrinth at the mastoid operation, and said that he had seen a number of cases where the labyrinth condition improved after the mastoid had been exenterated.

He expressed regret that he had not arrived in time to hear Dr. Isaacs' description of his artificial drum, and said that he himself had used pieces of rubber tissue cut large enough to rest on the remnants of the drum, allowing them to remain in place two to three weeks or longer, depending upon the local condition, though they sometimes cause a little maceration of epithelial tissue and must then be removed. He believed the drum recommended by Dr. Isaacs could be introduced more easily and would be less irritating.

Dr. Ralph Almour, closing the discussion, stated that the principle of affording drainage to a suppurative focus is one of the fundamentals of surgery, and that this principle is in no way altered by the presence of diabetes in an individual. While it is true that diabetic patients react poorly to surgery, it is also true that they offer no resistance to offset or localize an infection. Consequently the infection in the mastoid process presents a danger far greater to life than the operative measures to relieve it, and where the operation is performed under local anesthesia and proper measures have been instituted to combat acidosis, the patient's condition has been improved by the surgery on the mastoid. He also feels that it is unwise to render a chronic diabetic entirely sugar-free before operation and that the risk is much less, as regards acidosis, when the patient is operated upon in the presence of a small quantity of sugar in the blood.

He agreed with the previous speakers that in the cases of primary mastoiditis which he had presented there must undoubtedly have been some middle ear infection at one time or another. What he meant to impress upon the listeners was that none of the cases which he had seen had presented any clinical or otoscopic picture of middle ear disease. The drums in each of the cases were normal in appearance. In answer to Dr. Maybaum, he regretted that no bacteriological studies had been made.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Meeting of February, 1925.

The Importance of a Laryngeal Examination in Adults Prior to an Operation for the Removal of Tonsils. Dr. Louis Baer.

While the laryngologist will readily advise the removal of tonsils, when indications for their removal, local or constitutional, are present, he is not at all unmindful of certain complications and dangers that may attend or follow the operation. With all our present knowledge of the anatomical structure of the tonsils, and their anatomical relation to the surrounding organs; and having at our disposal the most modern instruments and appliances to make the operation more thorough and complete, and to obtain a clean operating field, we are still fearing some unexpected complication that may occur during or after the operation. Indeed, tonsillectomy should be regarded as a difficult surgical procedure and classed among the major operations rather than minor surgery.

Complications following tonsillectomy are the exception and in trained hands their percentage is negligible, yet accidents do occur among the best surgeons. Now and then we hear of a fatality from an uncontrollable hemorrhage, or from a local anesthesia. Otitis media, pneumonia and pulmonary abscess, in their order of frequency, are complications often reported in literature. A patient of mine, a boy, age 8 years, is now under the service of Dr. C. Jackson at the Jefferson Hospital, being treated for laryngitis following tonsillectomy performed three years ago by one of the most eminent surgeons in Chicago.

Tuberculosis of the larynx is another complication, which as we have observed, was influenced by operation on the tonsils. Whether the tonsillectomy was the direct cause of infection of the larynx, as statistics gathered by Mayo and Rarabertson show that 8 per cent of tonsils removed are tuberculous. That during the operation the infected blood, serum, or pus from the tonsils either by directly coming in contact with larynx or carried by the lymphatic channels that become exposed as a result of the operation, to the lungs and from there to the larynx. Or the tonsillectomy, by temporarily reducing the vitality of the individual, flared up an already infected larynx, I am not prepared to tell.

However, two cases came recently under the care of the nose and throat service of the Mt. Sinai Hospital with an unquestionable diagnosis of tuberculosis of the larynx in an advanced stage. Both cases gave definite histories that their trouble in the throat started immediately following tonsillectomy. As the time elapsed between the operation and the diagnosis of tuberculosis of the larynx was a few weeks, I am inclined to believe that in both the larynx was diseased before the tonsillectomy was performed.

Case 1: J. A., age 40 years, came to the Mt. Sinai Nose and Throat Clinic, June 2, 1923, complaining of sore throat. After a thorough nose and throat examination, the following diagnosis was recorded on his card : Chronic sinusitis, chronic hypertrophic rhinitis, chronic pharyngitis, diseased and hypertrophied tonsils, and chronic laryngitis. There was no evidence at this examination of the larynx to arouse a suspicion of tuberculous infection. The chronic laryngitis found was thought to fit in the picture of a generalized chronicly inflamed nose and throat, possibly due to the sinusitis or to the diseased tonsils. He received local treatment and was advised to have his tonsils removed.

Nov. 6, 1923, tonsillectomy under local anesthesia was performed by the writer. He was not examined, except the resident physician who is taking charge of admission of patients, since June 2, 1923.

A few days after the operation he came to the clinic complaining of a sore throat. An examination of the throat showed the ordinary post-operative picture. There was no evidence of injury to the surrounding structures. The larynx was not examined because nothing extraordinary was suspected. A gargle of aspirin, 10 grs. in one-half glass of water, was prescribed (t.i.d.).

He returned within a few days reporting that he felt better, but his throat is still sore, and was advised to continue the same gargle.

In February, 1924, about three months after the operation, he came to the clinic complaining again of a sore throat. He stated that since the operation the pain in the throat never left him completely, but persisted with moderate severity, for which he doctored himself with the aspirin gargle. But as he felt that he is getting worse he came to be examined. After a complete examination, we were astonished to find Koch's infection of the larynx in an advanced stage. The epiglottis was swollen, edematous, more than half-an-inch in thickness, with ulceration on the anterior surface near the upper margin. The arytenoids were swollen, the ventricular bands markedly thickened, obstructing from view the vocal cords, which could not be seen.

Wassermann test was negative. Sputum examination showed T.B.

Examination of the lungs showed definite tuberculous involvement of both lungs. He was treated for a while at the Mt. Sinai and Phipps Clinics, and in May, 1924, was sent to the Hamburg, Pa., Sanitarium. Left the sanitarium in October, and in Philadelphia was wandering from one clinic to another. His epiglottis, when I saw him last, was almost entirely gone, and the entire larynx is in a state of ulceration. Died Dec. 4, 1924.

Case 2: W. H., age 29 years, came to the Jefferson Hospital in January, 1924, complaining of a sore throat. He was advised to have his tonsils removed. April, 1924, his tonsils were removed in the Jefferson Hospital. Immediately following the operation he began to feel pain deep in the throat, for which he was treated at the nose and throat clinic of the hospital. About two weeks after the operation, on the advice of his family physician, he came to the Mt. Sinai Hospital Nose and Throat Clinic.

On examination the following was found:

Nose: Some congestion of the mucosa of both chambers, otherwise negative.

Throat: Tonsils successfully removed, anterior and posterior pillars not injured.

Larynx: Epiglottis markedly swollen, edematous and ulcerated on the anterior and posterior surfaces. Arytenoids swollen. Right arytenoid ulcerated. Ventricular bands swollen. Vocal cords congested.

Wassermann test was negative.

Lung examination showed consolidated areas in both apices. Sputum examination showed the presence of Koch's bicillus.

June 26, 1924, was admitted to the Rush Hospital, but left the hospital July 5, 1924, to be admitted two days later in the Eaglesville Sanitarium, where he died on Sept. 16, 1924.

In both cases the patients had no pain in the throat prior to the operation. Their first complaint of sore throat that brought them to the hospital was due to an attack of tonsillitis. They were treated accordingly and were free from pain until after the operation.

There is no doubt that the larynx in both cases had pathology before the tonsillectomy was performed, especially in Case 2, where only two weeks after the operation there was marked involvement with ulceration of the epiglottis and arytenoids. In Case 1 the patient had constant pain in the throat for three-and-a-half months, starting immediately after the operation the tonsils until the day when the diagnosis of tuberculosis of the larynx was made, when it was found to be in an advanced stage.

I believe both cases illustrate the ill effect of tonsillectomy on a diseased larynx of Koch's infection. They also indicate the vital impor-

tance of determining the condition of the larynx, even in an apparently healthy individual, before undertaking the operation ofr removal of the tonsils.

Dr. Baer in closing: Both cases were operated under local anesthesia. I believe every patient's chest should be examined before operation, whether it is a ward or a private patient. These two cases in my opinion show that an operation flared up a tubercular condition.

Just as an illustration, I had a patient who was apparently a healthy man. He met with an accident and on the following day became hoarse. An examination showed that his throat was markedly involved with ulcerations of the epiglottis and arytenoids and died of laryngeal tuberculosis five weeks after the accident, showing that the accident flared up the condition.

DISCUSSION.

DR. M. S. ERSNER: I believe Dr. Baer has touched upon a most vital subject. Papers like these remind one of the precautions we are to take before attempting a tonsil operation. We are usually concerned with ether complications, pulmonary abscesses and hemorrhage, but are prone to forget constitutional diseases. We only realize it after we have stumbled into pitfalls.

To reiterate, it is up to us to take all precautions possible and by that means only, can we avoid unforeseen complications.

DR. STOUT: I think you can usually determine whether patient has tuberculosis or not before operation. Generally everything that happens after an operation is attributed to the operation. I do not think that the operation was the cause of these two cases mentioned by Dr. Baer.

DR. ZACKS: I believe that starvation plays an important part in these cases after the tonsils are removed because the patient is unable to get the proper nourishment owing to the post-operative discomfort. They must be regarded as potential tuberculous patients and the border line which represents their health margin is very narrow. The operative trauma, discomfort, and period of starvation which follows, which may be from one to ten days, may be sufficient cause to do the damage. This type of patient requires a great deal of food to counteract the general systemic condition.

DR. OLSHO: I would never remove tonsils in an adult unless the patient has previously been examined by an internist. At the Phipps Institute the tonsils of tubercular patients are not removed.

DR. LAESSLE: In Dr. Baer's cases, I would like to know if he has been using local or general anesthesia. The consensus of opinion, as I understand it, is that tuberculosis of the larynx is secondary to pulmonary, and we know that we might light up a dormant stage of tuberculosis when we administer general anesthesia.

The Postural and Non-Surgical Treatment of Empyema of the Antrum. Two Cases and a Novel Posture. Dr. Sidney L. Olsho.

(*Published in full in* THE LARYNGOSCOPE, *April, 1925.*)

Dr. Olsho points out the importance of postural measures in the treatment of antral infections either with, or independently of surgery. He draws attention to the advantages of postural treatment particularly in children, when it is desirable to avoid surgical procedures. In the treatment of the latter a novel posture is demonstrated.

A part of the office antrum irrigation treatments, after shrinking, are made with the patient in Escat's position, that is head far down and opposite ear up, and followed by the expulsion of all fluid from the antrum by air before the canula or Lichtwitch needle is withdrawn, the patient meanwhile remaining in the same position.

In using suction, strong negative pressure is condemned. In preference to a machine he recommends a BD Co. ½ oz. Asepto Urethral Syringe consisting of an all-glass tube which has a bluntly tapering end which fits the nares and a thick rubber ball which after compression exerts ample pull.

If used for effect upon the antrum, one should take advantage of the force of gravity by employing it with the patient in the position mentioned, head far down and opposite ear up. Nose blowing is one of the best forms of suction, and this should be done while the head is lowered. This position for noseblowing favors the evacuation of the antrum, also when a permanent opening into the inferior meatus has been surgically established, as the floor of the antrum is lower than the floor of the nose.

He cites a case, G. F. W., age 44 years, who had a long standing, undiagnosed antral infection of dental origin, whose prompt recovery is attributed: First, to the removal of the offending tooth. Second, to the office treatments, which included antral irrigations and suction carried out to a considerable extent with the patient in Escat's position. Third, this patient is in the habit of going through certain exercises daily which bring his head near the floor, which therefore favors the evacuation of the antrum. He is directed to use a well known shrinking oil, fifteen minutes before taking these exercises. This oil contains: cocain alkaloid, camphor, oil of cinnamon, liquid petrolatum.??? Fourth, he is directed to lie on his abdomen, flat on his bed each morning and night with his head hanging over one side toward the floor, so that he can see under the bed. He is directed to instil the oil high in his nose about fifteen minutes before. He is to blow his nose well while his head is in this lowered position.

In the second case cited, a boy age 5 years, had a tonsil and adenoid operation one year previously which had not had a favorable influence upon the constant, thick, greenish nasal discharge, of which he complained. Both antra were dark on transillumination, and bilateral antral empyema was confirmed by the X-ray.

In the successful treatment of this patient, a novel posture is demonstrated (illustration). No surgical procedure, not even a diagnostic antral puncture was employed. The office treatments every three or four days consisted simply of shrinking the turbinates, followed by a very slight irrigation of the nose, then after a lapse of fifteen minutes the patient was held by his feet, with head downward and asked while in this position to blow his nose well. Suction was applied by means of the urethral syringe, with patient in the same position. Subsequently, sometimes the nose was again slightly irrigated with warm salin solution, and the treatment finished with an oil nebulization.

The home treatment was similar. The nasal oil was instilled, and one of the parents held the boy by his feet, head downward, as shown in the illustration. The patient was asked to blow his nose very well. Improvement was very marked after a short time. The patient was discharged when the transilluminations were finally persistently negative, and all nasal discharge had disappeared. The postural measures at home were continued uninterruptedly throughout the course of his treatment.

Dr. Olsho closing: Some questions that were asked have been answered by other men. I wish to emphasize that posture is a valuable accessory to any form of treatment.

Air should not be injected into the antrum before irrigating. Beck advises suction, to determine whether the needle point is properly oriented.

DISCUSSION.

Dr. Hitschler: So much is said concerning needle puncture of the maxillary sinus that we sometimes forget we can lavage the sinus via the natural opening, or via an accessory opening when the latter is present. This procedure is successful in about 20 to 25 per cent of cases; in the sphenoid in about 30 to 40 per cent. For this purpose a very delicate hard rubber canula is used. It may be easily curved to suit any particular case. The rubber canula causes no discomfort, especially when slight anesthesia is established, and is much less objectionable to the patient than the needle puncture.

Dr. Hunter: I think the rubber bulb mentioned would be harmful if used in the ear as suggested in the discussion. If a bulb is to be

used by the patient it should be tested with a vacuum gauge to find out the amount of suction it will give. I find that some bulbs give 12 to 15 inches of vacuum. Suction should always be controlled by an accurate gauge. Two inches are sufficient for the ear and 6 to 10 for the nose. No machine pump should be used without a gauge and by pass attached.

Dr. P. Stout: Cameron lights are very good not only for antra but for mastoids. They have a regular mastoid light. In asthmatic cases, even if the antra are cloudy on transillumination and in the X-rays the washings many times are clear.

When I was a youngster, people used to use snuff. I think they must have derived some benefit from it because it caused them to sneeze, but it was a bad habit to form.

Dr. H. B. Cohen: I think Dr. Olsho has given us a very good paper followed by an excellent discussion. I thank him for the opportunity of listening to it.

We have to vary our treatment of maxillary sinusitis according to our patients, putting the patient on his abdomen, head hanging down over the bed and inserting drops we have used for a number of years so that the drops would reach the upper sinuses. The osteum, in my opinion, is not a true window, but canal-like, whose direction is up, back and in or down, forward and outward. Placing the patient in such a position is described by Dr. Olsho and is similar to the one we have been directing our patients at Medico Chi and in private practice, will direct the discharge towards the osteum, but I cannot see how a large cavity with but one opening can expel the heavy mucoid discharge seen in acute cases. It requires another opening for air inlet and that we make with the Tichwartz needle and aid it by the pressure of air and water, either one or both. The position mentioned may be helpful in children and occasionally in adults and I think that is what Dr. Olsho wishes to convey. We cannot treat all cases alike. In the first stage of acute maxillary sinusitis with its inflamed membranes I think one can wait a day or two for the "reaction of inflammation" before puncturing the antrum when it will not be so painful as the needle punctures the inner antral membrane. I cannot see where this position can be used other than in chronic cases. The postural position is not as good as the needle. Blowing the nose only blows out what is loosened and has overflown in the middle nasal passage. Acute maxillary sinusitis is not treated immediately with the needle, but as I have mentioned above.

Dr. S. Skillern: We all know that the maxillary ostium, being placed in the antero-superior portion of the sinus at the junction of the superior and internal walls, is in the most unfavorable position for drainage. It was in a favorable position when we walked as apes, on all fours, but as soon as we assumed a more or less erect posture, it changed to the most unfavorable site, consequently the only time the maxillary sinus drains is when we are lying down, or have our heads on a level with, or lower than our shoulders and the moment our purulent maxillary sinus cases raise their heads, drainage ceases and the sinus starts to fill. Dr. Olsho, in standing his cases on their heads or having them lie flat on the bed and look under the bed for their shoes is putting the case in the correct position for drainage. But lying flat on the bed without a pillow on the unaffected side, thus having the affected side up, will give just as good drainage.

In my opinion, the X-ray is an excellent adjunct, not as good as transillumination, but useful in making diagnosis. However, I never make a diagnosis from the X-ray alone. I had the opportunity of studying over a hundred purulent maxillary sinus cases that I sent to X-ray. About 50 per cent of the X-ray diagnoses were correct. We must remember in looking at our X-ray plates that the bones of the two sides may be of a different thickness, or density, also that a thin watery pus will not give us the shadow that a heavy purulent pus will give and that polypoid degeneration will give very little, if any, shadow.

In my opinion, the safest and surest diagnosis of maxillary sinusitis is the Lichtwitz needle.

It is true there has been reported several deaths from needling the maxillary sinus and that on two occasions I have inflated the cheek muscles with air, but with proper instrumentation and due care I do not believe a patient runs as much danger of injury as they do while crossing a city street.

In the Ross H. Skillern Clinic, where not only the staff but also the students make daily needle punctures of the maxillary, no fatalities have ever occurred.

I believe if, after the needle is inserted, you withdraw the needle about half-way, then without undue pressure you slowly inject a small quantity of air into the sinus, you are subjecting your patient to little or no danger. If the sinus is infected you generally get a bubbling sound as the air passes through the exudate, but as I always wash out the sinus with warm normal salin solution once the needle is inserted, I depend not upon the sound, but on seeing the pus in the returned washings. Dr. Stout says that the washings from apparent purulent maxillary cases suffering with asthma often returns clear.

In a suspected case of maxillary sinusitis with a clear return of the washings, I generally have the patient return in a day or so, and again wash out the sinus. On several occasions, I have irrigated maxillary sinus with a clear return of the first, or even the second washings. to find a large gluttonous mass of thick, tenacious pus in the third washing. This pus has been so adherent to the mucus membrane that the fluid had passed over it, without dislodging it, or the mass was too large and firm to pass out of the ostium. After this pus was removed the patients stated their condition was greatly improved. With this kind of pus it is next to impossible to diagnose by posture or suction. until the contents of the sinus become thin enough to conform its shape to the ostium and run through this small opening, as brought out by Dr. Laessle.

In old chronic maxillary sinusitis in which the pus has a decided odor and so intimately mixes with the water as to form a milky fluid on its return, it shows a degeneration of the normal ciliated epithelium to either a polypoid mass or to pavement epithelium, and even though the bones may not be involved as yet, it will be, sooner or later, if radical procedures are not instigated.

There is such a case reported as cured after eighty some odd washings, but how many patients are going to allow that?

If after what I consider a sufficient number of washings there is still a foul smelling, milky-like return of the washings, I advise a radical operation, such as a perturbinal, Caldwell-Luc or Denker.

Dr. Laessle: I consider this method to be valuable for certain types of cases, especially those of chronic sinusitis in children or adults, where the discharge is thin and where the ostium is large enough to permit the discharge; but in the acute stages and subacute, the rule is that you find the mucous membrane and the ostium so swollen that no discharge will take place. Now, in the chronic types, I can readily understand why this discharge will take place, but I do feel that the Lichtwitz needle is necessary, both from a diagnostic standpoint and a therapeutic standpoint.

C. P. LaG., age 30 years, real estate worker. Diagnosis: Paralaryngeal or extralaryngeal abscess; admitted Jefferson Hospital, Dec. 25, 1924; discharged Dec. 26, 1924; service Dr. P. S. Stout.

C.C.: Difficulty of speech, difficult swallowing. Pain in the neck.

F.H.: No bearing on the case.

P.H.: Typhoid fever when 15 years old. Influenza and pleurisy in 1922 (mild), from which the patient recovered and had no complications. Had tonsils removed eighteen months ago, after having had recurrent attacks of sore throat. Tonsils were said to be chronically infected. Had bronchitis ten years ago, also two years ago. Recovery uneventful. Had ankle fractured in 1912. Patient gives a history of

having convulsions during first three years of life. Has not had them since 3 years of age.

P.I.: Onset about one and one-half weeks ago with some difficulty in swallowing. Last Saturday (Dec. 20) patient felt chilly. Temperature that same night was 100° F. Temperature decreased on Monday morning and at noon of the same day the patient went to his downtown office. Also worked the next day (Tuesday). On Tuesday night his throat became sore and there was difficulty and pain when opening and closing the mouth. Iodin was applied on the side of the neck. Condition thought to be quinsy and the patient used "Lavoris". This morning (Thursday, Dec. 25) patient's condition became worse. Could not talk or swallow. Swelling apparently increased. Patient came to Dr. Stout, and upon examination and manipulation large amounts of a whitish pus was spat up by the patient. Throat condition immediately relieved. Could talk better and freely move jaws. Patient brought to hospital on afternoon of Dec. 25, Thursday.

Patient in bed, resting comfortably. No dyspnea, dysphagia or choking. *Head: Eyes and ears* negative. *Mouth* m.m. of pharynx somewhat injected. Tonsils removed, tongue dark brown coating. Teeth in good condition. *Larynx:* Epiglottis and aryepiglottic folds edematous. Entrance to larynx very much decreased in size. Epiglottis so edematous that when first seen, looking with mirrors, not easily recognized. Right side of larynx swollen. Neck swollen.

Chest: Lungs: Breath sounds clear and regular. Expansion equal, no rales heard. *Heart:* Heart sounds are of good quality. No increase in heart dullness over normal. No murmurs, shocks, or thrills.

Abdomen: No pathology found.

Extremities: Negative.

Dec. 26, 1924, 1 p. m., upon discharge: *Larynx:* Epiglottis. Swelling and edema almost gone. Now able to see into the larynx. Cords not swollen or reddened, but appear short. Right side of larynx anteriorly appears slightly swollen or possibly pressed inward. There is no evidence now of abscess, but slight amount of pus just outside of larynx, right side. Swelling in neck gone and patient can eat, drink, and speak without pain or effort. Patient says he spat up pus during greater part of night.

Temperature rose to 101° on the evening of Dec. 25. Dropped to normal next day. Urine, negative. Sputum, negative for T.B. No other reports.

Additional notes: Appearance when I examined him at 12:30 p. m. on Thursday, Dec. 25, Christmas Day. Patient came into the office with his head held a little to one side, apparently suffering from something that was interfering with speech, swallowing, and beginning to interfere with breathing.

Examination showed some swelling on the outside of the neck, tender. Looking on the inside of the mouth no evidence of anything wrong as far as the appearance of the fauces was concerned, but with the laryngeal mirror very distinct and alarming symptoms were quite evident. The larynx was pushed over to the left, epiglottis swollen so that it was just possible to get a glimpse of the edematous arytenoids. A great mass was present on the outside of the larynx. While trying to see the extent of this mass it suddenly broke, pus was hawked up, about one ounce of white pus. Relief came at once.

The patient was sent to the Jefferson Hospital for observation.

DR. STOUT in closing: There was no salvation in this case. I am glad Dr. Kistler brought up his case.

We do not know where abscess opened. After it opened, he had a very high temperature.

DR. OLSHO: Posture the patient with head dependent and use the aspirating needle with suction, or incise, with suction in readiness.

DR. H. B. COHEN: About three years ago, I was called to the St. Agnes Hospital to perform an emergency tracheotomy. It was a patient of Dr. Laessle's and he could not get there as soon as I. All the history that I got was an abscess around the glottis, possibly gummatous. The

patient took a turn for the worse with marked dyspnea. Just as I entered the hospital I was informed that the patient felt something break and had brought up considerable pus. This gave him instant relief and no tracheotomy was done. A plus Wassermann was reported later.

I should like to ask Drs. Laessle and Stout whether they could or did find the site of the abscess.

DR. LAESSLE: I recall, many years ago, when I was a student, that Dr. J. C. Da Costa, in one of his lectures, emphasized the words: "Never operate upon a retropharyngeal abscess in an erect position." This made an impression upon me, and I suppose it appears like it does to all men when they start out to practice, that they seem to get the most severe cases at first, or at least, they appear to be the worst, and I can recall distinctly of having had the father suspend the child by the limbs, head down, and when the abscess was incised, huge quantities of pus was removed, and while draining, the head was lowered to avoid the pus entering either the lung or the stomach; fortunately, my case got well. Perhaps, Dr. Tucker can enlighten you a little more on this subject.

DR. KISTLER: About two years ago I was called to Philadelphia to visit a patient who had been under tear with laryngitis. Her breathing was very heavy.

Upon examination I found the right side of the larynx very edematous, epiglottis enlarged. Her breathing was so bad that I felt she would not live through the night, so I sent her to the hospital and had a tracheotomy tube inserted. I believe that if the patient had gone another twenty-four hours she would have died of suffocation. I watched her closely for about three days, and then brought into her room a tonsil suction machine and obtained about an ounce of pus around the abscess. Three days after the abscess was opened her recovery was eventful and her breathing was normal.

Paper. **Pemphigus as a Beginning Tonsillar Manifestation.** Dr. Henry Dintenfass and Dr. Sigmund S. Greenbaum.

Dr. Dintenfass in closing, in the diagnosis, which is of course of the utmost importance in this disease, there are three points to be considered.

1. The intense, out of all proportion to the clinical manifestations.
2. The great amount of salvation.
3. The fact that there is no glandular involvement. It is the absence of this involvement which differentiates pemphigus from syphilis and Vincent's angina, the diseases which it is almost similar to.

DR. S. B. GREENBAUM: Out of the twelve cases of pemphigus admitted to the Polyclinic Hospital in the last two years eleven died. One of the signs of malignancy of pemphigus is its onset with lesions on the mucous membrane. I have had a patient where the lesions were limited to the eye and mucous membrane of the palate. The blebs in the mouth rupture rapidly and there is left an erosion. I used in this patient mercurochrome intravenously. There is no definite cure known for pemphigus. The patient died, but not due to the fact that he was treated with mercurochrome, although that may have had something to do with it, but due to the fact that he refused to eat and felt that he was going to die.

More than 50 per cent of the cases begin with lesions in the mouth.

DR. WIEDER: I saw a patient about two years ago. For about two months he was treated for almost everything imaginable but pemphigus, the diagnosis being made only after the appearance of blebs on the body. He died within three months You have considerable redness of the mucous membrane in the areas in which the blebs have broken and the loose skin thrown off.

Meeting of April, 1925.

Paper: **Optic Neuropathy and Sphenoethmoid Disease.** Dr. Clifton M. Miller.

DISCUSSION.

DR. H. M. LANGDON: I wish to express my thanks to the Society for the compliment of permitting me to open the discussion on Dr. Miller's paper. It is a most complete exposition of the relation between the sinuses and the optic nerve to which he has limited his essay.

Inflammation of the optic nerve may occur any place in its course, but ophthalmoscopic changes do not occur in the early stages unless the portion involved is anterior to the entrance of the retinal vessels into the nerve, that is about 12 m.m. behind the globe. Inflammation behind this site is what we call retrobulbar neuritis and while we have loss of vision, especially central vision, and pain on moving the eye, especially if it be pressed back into the orbit with the hand, we do not have fundus changes until there is a descending atrophy with pallor of the temporal portion of the disc, from degeneration of the papillo-macula bundle. Should the neuritis occur anterior to the entrance of the retinal vessels we have edema of the disc and surrounding retina, with exudation of lymph and possibly hemorrhages from the pressure on the returning venous trunk. Both of these conditions may arise from sinus involvement but the retrobulbar type is by far the more common, resulting in a central scotoma, without changes in the peripheral field or the fundus.

Retrobulbar neuritis is also caused, as Dr. Miller has pointed out, by alcohol and tobacco, and is one of the most frequent complications of multiple sclerosis. Quinin ampbyopia results from a spasm of the retinal arteries, producing a degeneration of the ganglion cell layer of the retina and an ascending optic atrophy, with great diminution of the peripheral field of vision, but frequently normal central vision, a visual result quite unike that of retrobulbar neuritis. Where all of the more easily determined causes of retrobulbar neuritis are absent the sinuses are probably the cause, though other foci of infection may be the producing factor as was found in the case of:

Mrs. H., age 27 years, who reported in January last with a history that for six months O.D.V. had been blurred, without marked pain or inflammatory signs. She had been treated by one purporting to be an ophthalmologist, but no physical examination other than ocular had been made. Central vision was cut to 2/60 and there was a large absolute central scotoma with pallor of the temporal portion of the disc, on account of which a poor prognosis as to the return of central vision was given. She denied the use of tobacco and alcohol, there were none of the other manifestations of disseminated sclerosis and the nasal sinuses seemed the most likely place of trouble. Her rhinologist, Dr. George B. Wood, found no signs of nasal disease, but did find very badly infected tonsils, the removal of which resulted in a complete functional cure, central vision returning to better than normal, but the pallor of the temporal portion of the disc remaining.

The case was very instructive to me, being the first I had seen where retrobulbar neuritis resulted from infected tonsils and central vision returning to normal in spite of the apparent atrophy of the papillo-macular bundle.

Dr. Miller shows how more than one of the possible causes of retrobulbar neuritis may be present and I have no doubt that some of the cases where visual loss persisted in spite of the cessation of the use of tobacco and alcohol, were due to unrecognized sinus involvement, and possibly the other toxic agents were secondary or even not participants in causing the trouble, a thought pregnant with sadness when we consider the possibility of the needless self-denial.

To be Continued.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

THE TEACHING OF UNDERGRADUATE LARYNGOLOGY.*

DR. L. W. DEAN, Iowa City, Ia.

It is with a proper feeling of pride that I convene the Forty-Seventh Annual Congress of the American Laryngological Association. It is a sufficient honor to be a fellow of this august body. This Society has done more than any other association to advance modern laryngology. It has done so because of the particular type of men composing this group. They are men with practical laryngological ability. They have the firm foundation of internal medicine and pathology. Each has the research type of mind. It is impossible for this association to be other than a research body. To be chosen president by such a group of men is the greatest honor that has or will come to me.

A careful study of the discussions of the last few annual meetings of the association of American Medical Colleges will convince us that the curricula of the various medical schools today are not satisfactory. I am positive that no faculty is satisfied with the work it is doing. Most schools have the course of study in process of revision. We have been guided by regulations of the College Association, the Council on Education of the A. M. A. and the Federation of State Boards of Health. Their regulations, by eliminating certain schools and stimulating others to meet the course as

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outlined, have served a most beneficial purpose. The time has now come when the faculties of the various medical schools are studying their own particular problems, and meeting the exigencies of the situation as they deem best.

During this period of reconstruction, laryngology, with the other medical sciences, will be studied with regard to its use in the undergraduate medical curriculum. I do not believe one person in this room can definitely say that laryngology will or will not be dropped as a required study for graduation.

As to whether or not it will remain a required study rests, I believe with the members of this association. If it is proven that internal medicine, neurology, pediatrics and surgery can be taught best by association with work in laryngology it will not be dropped. A knowledge of internal medicine, pediatrics, neurology, general surgery and obstetrics will be the goal of most undergraduate medical faculties. Time to accomplish this will be so difficult to find that nonessentials will be discontinued. We know laryngology is an essential undergraduate study. The professors of internal medicine, neurology, pediatrics, surgery and obstetrics, who will be most influential in arranging the clinical part of the curriculum, must be convinced of this if they do not already hold this view. I have tried making laryngology so essential to the teaching of internal medicine, neurology, pediatrics and general surgery that the heads of these various departments would feel that it was essential to the undergraduate teaching of their particular subject. I believe in this I have been successful.

In teaching undergraduate laryngology, there are certain things purely laryngological that must be taught. For the most part, however, we should confine our teaching to the laryngological side of general medicine, pediatrics, neurology and general surgery. We must teach not only the science of laryngology but the art of laryngology. The art cannot be practiced without the knowledge. The art of laryngology I would define as the method of applying the fundamental facts of laryngology to the relief of the sick individual. It depends upon the development of thought and judgment in the individual. A century ago the art of medicine was taught in the undergraduate medical schools at the expense of the science. Today a just criticism of undergraduate medical education would be that the teaching of the art of medicine was neglected. Let us convince our students that every patient is a human being psychologically influenced by his disease. Science permits us to

diagnose an incurable malignancy. Art permits us with perfect truthfulness to encourage the individual to carry on his hopeless fight in the best possible way. By convincing him and his family that everything possible is being done, a most beneficial thing has been accomplished. When science stands helpless, art lends the supporting arm. The older laryngologists are far more proficient in the art of laryngology than the younger. The members of this association are particularly qualified to instruct both in the art and the science of laryngology. It was my good fortune and pleasure last winter to be present while one of our members consulted with one hopeless case of malignancy after another. Nothing could be more beautiful than the satisfaction the patient and members of of his immediate family derived from the conference. This is the thing that is being overlooked in modern education.

Laryngology as a science is no different from internal medicine. Its development depends upon the same things as does the development of internal medicine. In short it is just as integral a part of internal medicine as is the science of gastrointestinal disease. Its progress depends upon a knowledge of general physiology, metabolism, pathology, dietetics and epidemiology. It is a wholesome thing to find metabolism, biochemistry, biophysics, epidemiology and dietetics entering the laryngological field.

Teachers of undergraduate laryngology should be clinicians and research men. They must devote the same time and energy to the teaching of and research in laryngology as the teaching staff in internal medicine gives to internal medicine. If we give this time and energy to development of and the teaching of the laryngology of internal medicine, pediatrics and general surgery, medical educators will be influenced to give laryngology more time in the undergraduate curriculum rather than less.

At all pathological and clinical conferences where the representatives of the often so-called major teaching departments are present the laryngological staff should be in attendance. By entering into discussions they keep alive the importance of laryngology to the proper understanding of the pathology of general disease. They bring up questions for discussion which the general man and the general pathologist would overlook. What can be more important in such conferences than the laryngological side of sudden deaths following operations on the thyroid? The question of laryngeal death without manifest clinical evidence of laryngeal obstruction must be considered; the symptomatology of gradual paresis of one

vocal cord may enter the discussion. The ability of the pathologist at autopsy to detect the presence of or absence of preoperation paralysis of one vocal cord might be considered. These things are strictly laryngological but general surgery and internal medicine cannot make satisfactory progress in the study of goiter without the assistance of the laryngologist. I remember a case where blastomycosis of bone of the leg was said to be secondary to blastomycosis of the larynx. A proper presentation of the subject of blastomycosis of the larynx by the laryngologist ruled out the larynx as a primary focus. In every hospital for the teaching undergraduate medicine, teamwork on the part of the staff is a most essential thing. The laryngologist is a most important member of the team and he should be present on all occasions and do his share of the work.

It is axiomatic that the laryngological budget should comparatively approximate the other teaching budgets. The budget is the constant bugbear of medical college executives, and there may be financial reasons for giving laryngology a less permanent part in undergraduate teaching than is best for the undergraduate student. In every teaching hospital, laryngology must have its proportionate share of beds. The exigencies of the teaching of the undergraduate student, and the necessity for the laryngological care of the patients demand this. Undergraduate medical students should have laryngological house cases assigned to them for study. They should examine and keep a complete clinical chart of the cases. They should have ready access to the laryngological wards at all times in order to carefully observe their cases and record their findings. In short, they should do their work in laryngology the same as in internal medicine. Naturally they must always be under the careful supervision of an instructor. I feel it is better if the laryngological out clinic is in intimate connection with the out services of internal medicine, pediatrics and general surgery. Further, the laryngological house cases should be under the same roof as those of internal medicine, general surgery and pediatrics.

At Iowa the laryngological service is housed in the same building as internal medicine, general surgery and neurology. Their out clinics are close together. Pediatrics is housed in a separate building. The housing of pediatrics in a separate building is a constant handicap to rendering the very best laryngological service to pediatrics, and to the undergraduate teaching of the laryngology of pediatrics. It is almost impossible to get the close co-operation which is

so essential and which is secured best by close contact of both out clinic and house services.

Certain things strictly laryngological must be taught the undergraduate. He must be taught the technique of examination, otherwise he will be unable to apply his knowledge. Quinsies, inflammations of the larynx, common colds and many other strictly laryngological subjects must be considered. Nevertheless, the bulk of the teaching should be the laryngological side of internal medicine, general surgery, pediatrics and neurology. Perhaps you will say that all these matters are strictly laryngological. I would not be inclined to debate this because a knowledge of general medicine is the essential foundation for laryngology and we are all, first, physicians and, second, laryngologists.

Laryngology including, as it does, bronchoscopy, esophagoscopy, certain parts of brain surgery, the plastic surgery of the throat and nose is such a tremendous subject that the undergraduate medical student must invade its realm in order to be able to grasp the science of internal medicine. However, undergraduate medical students cannot be taught all of general medicine and surgery. With the time at our disposal we must teach those things, a knowledge of which will benefit them most as general practitioners.

Requisition cases or transfer cases from the general services of the hospital furnish excellent material for teaching because they are cases which go primarily to the general practitioner. From the medical, pediatric and general surgical wards alone we secure an abundance of teaching material. Certainly most cases of headache should be studied from the laryngological side. Then come the cough cases, the goiter cases, infants with hoarse crying and adults with hoarseness, the cases with hemorrhages from the upper respiratory tract, the multitude where a focus of infection is to be sought for, the cases of difficult swallowing and the lung abscesses. Infants with fever without apparent cause, or with gastrointestinal upsets furnish a very large number of instructive cases. At times during inclement weather, it seems as if every infant in the pediatric service was a laryngological case. In every teaching hospital there should be a large number of requisition and transfer cases from the general service to the laryngological service. If this is not true, undergraduate medicine is not being taught in the best way. This material is the very best for teaching laryngology to the undergraduate student. By diagnosing and treating these cases, by assisting the general men in diagnosis, by helping in the teaching of general

medicine, pediatrics and surgery, by becoming an integral part of the teaching, hospital laryngology becomes indispensible to the undegraduate medical school.

The teaching of graduate laryngology in America is on a very satisfactory basis. The efforts of the committee on the teaching of Laryngology representing The American Laryngological Association, The American Otological Society, The American Laryngological, Rhinological and Otological Society, The American Academy of Ophthalmology, Otology and Rhinology and the Oto-Laryngological Section of the A.M.A. have had much to do with bringing about this condition. This committee had the moral support of all these societies, and exerted a decided beneficial influence on standardizing not only the required course, but the requirements for admission to graduate work in laryngology. Most of the short courses looking forward to the production of laryngolgists have disappeared. Their places have been taken by courses created by members of this association who have made use of the facilities at their disposal and produced excellent courses for the teaching of graduate laryngology. We have convinced most of the universities and medical schools that the graduate instruction in laryngology was just as much the function of the university as the graduate study of pathology or any other medical subject.

Money and clinical facilities for the work have been granted by many of these schools. The result has been the creation of well balanced courses in graduate laryngology. In this connection we must not forget the influence exerted by the work that is being done by the American Board of Oto-Laryngolgy. I have been surprised by the influence that it has on the development of laryngology in the middle west. Every young laryngologist I know is preparing himself for his examination before this board, if he has not already taken it. The older laryngolgists should secure a certificate from this board in order to help them in their work.

Laryngology today covers a broad field. In teaching graduate laryngology it is advisable to cover the whole field thoroughly. The curriculum must include courses in bronchoscopy, esophagoscpy, the plastic surgery of the nose and mouth, the lesions of the tongue and buccal cavity, the tumors of the jaws. The diagnosis of lesions in the neck and its surgery must be considered. Certain parts of neurology and a knowledge of certain phases of brain surgery are essential. Just as in general surgery there are certain men who are outstanding as goiter men, orthopedic surgeons, neurological sur-

geons, etc., so in laryngology there will always be laryngologists who will be outstanding men as bronchoscopists, plastic surgeons, operators in the larynx or specialists in voice, etc. It is not advisable for these subdivisions to become separate specialities, and I do not believe they ever will. Too much specialization is a bad thing. The practice of laryngology argues against the universal carrying out of such subdivisions. The exigencies of its practice prevent it. Certainly it is of great benefit to laryngology for a few laryngologists who because of particular ability along certain lines to limit their activities to a particular subdivision, and by carrying on intensive work and research in their particular subdivision to advance it materially and benefit laryngology as a whole. Such men are of particular service in handling the very difficult cases in their particular line of work. Most of us, as we grow older, limit our activities and our interest to particular lines of work. We find our capacity for work diminishing; the financial reward may not be longer needed. It is a fine thing to forward the cause of a particular subdivision of laryngology, rather than to retire and rob laryngology of this particular expert service.

The teaching of graduate laryngology must be done by each of us as we think we can best accomplish the desired end. In its final analysis it is nothing more or less than imparting to the student the laryngological knowledge that has accumulated during the ages of civilation. If the student possesses creative thought to a marked degree, he, during his lifetime, will add to this knowledge. One of the functions of the graduate teacher of laryngology should be that of detecting the few individuals with this rare ability and directing them along proper channels. The mass of laryngologists will not help in increasing this knowledge. Creative intelligence is confined to a few.

No greater compliment could be paid to any man than to be made president of this association, each member of which possesses this rare ability.

THE PROBLEM OF FOCAL INFECTIONS IN THE NASAL SINUSES.*

Dr. E. Ross Faulkner, New York.

The great increase in our knowledge of various diseases which has accrued in the past ten years, has tended to produce a simple classification of all pathological phenomena, so that many a symptom complex formerly considered an individual disease, has been relegated to the sphere of pure symptomatology.

There have been very few additions to the number of specific infections discovered, but the manifestations of these infections in all parts of the body have been co-related and more simply classified. With our advance in knowledge, we have to abandon some of the old methods of thinking of infections, especially in the matter of attributing any constancy of exhibition either in the course of the disease, or its localization when caused by a known specific organism. Experimental studies in the predilection of organisms, and variations in character of the same organism, have given us an explanation of these variations. Thus the symptoms depend on the organ or tissue selected, as well as on the virulence of the organism and the resistance of the patient.

There is not an exact definition between local and general infections, except in few instances. Most of the local infections can, under certain conditions become general, and many of the so-called general infections produce all their symptoms from a special focus in some particular part which offers it a favorable field for development, and according to this particular localization, the whole symptomatology will vary. Thus an infection in lymphoid tissue will produce a severe toxemia from absorption with involvement of neighboring glands, while one localized in tissue proximal to large venous channels may produce few symptoms from the local lesion, but may quickly invade the blood stream with metastases in other parts. All infections must begin their course as a local process, but very few remain local. Tetanus and diphtheria are the best examples of those which remain local and produce their symptoms from absorption. Syphilis is a local infection in the beginning, but very quickly becomes general, and produces its symptoms from various secondary localizations. Most of the others can be either local or

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general. Let us consider briefly how infections produce the morbid changes which follow in their train: First, by absorption of toxins; secondly, by invasion of the blood stream through the veins in the neighborhood, or indirectly through the lymphatics.

The distinction between the two processes is not always easy to determine, and many pathological effects which we formerly thought were entirely due to toxins absorbed from a primary focus, we now know to be due to the actual migration of bacteria from this focus into the blood stream, and to the production of secondary lesions. Thus Ophülus has shown experimentally that in acute glomerular nephritis developing in animals from injection of streptocci, the bacteria can be found during the acute stage. No doubt many of the chronic changes in the kidney which were formerly considered degenerative, have been initiated by bacteria of low virulence which had their source in some primary focus. Likewise, in joint lesions which were once thought to be due entirely to toxins, bacteria have been demonstrated.

It would seem reasonable to assume that organisms entering the blood stream from a primary focus could only do so during the acute stage of infection, and that symptoms from a chronic focus could only come from absorption. All residual foci, however, are subject to acute exacerbation, and during this period probably, there may be invasion of the blood stream. There is constantly, from all chronic foci, a slow absorption which produces slowly progressive degenerative changes leading to the deterioration of health. If one examines the blood of these cases harboring such a focus, they will find at first a retention of chlorids and urea, with an associated hypertension and defect in kidney function. These changes are progressive, finally producing degeneration of vessels and kidneys. Removal of the causal focus will stop these changes, and if the process has not lasted too long, will effect a complete restoration to a normal condition.

The phenomenon of anaphylaxis is in many cases due to the absorption of bacterial proteins from a focal infection. Many cases of asthma can be explained in this way. What part focal infections play in the disordered function of the ductless glands has not been determined, but some time, when some of the speculative theories in regard to the co-related function of these little organs have been abandoned, and we acquire some more exact knowledge, we may find that focal infection will be considered the greatest cause of their disordered function.

The various lesions now ascribed to the presence of a focal infection include the acute and chronic inflammations in almost all organs of the body. Thus appendicitis, nephritis, cystitis, pyelites, arthritis, endocarditis, simple and malignant peptic ulcer, retinitis, and choreditis, iridocystitis, neuritis of special sense and sensory nerves, myositis, myelitis and pancreatitis. Many of the lesions which formerly were considered due to syphilis can be produced by a focus infected with pyogenic organisms. Thus the degenerative changes in small vessels leading to hemorrhages such as occur especially in the delicate tissues of the eye, we now know may be due to a puc focus. Probably Meniere's disease has the same etiology. I recently saw a case of Meniere's, which had also a hemorrhage into his vitreous, and had an obvious infection of his tonsils and sinuses, with a negative Wassermann. Syphilis represents a typical focal infection in its manifestations, but the primary focus always disappears, and the morbid changes are produced by secondary foci, often remaining latent for many years, a habit which they have in common with all other types of foci.

Having reviewed all these general effects from a focal infection anywhere, let us pass on to the consideration of the course and manifestation of focal infections in our special field — the nasal sinuses. The incidence of such infections in this field is extremely frequent, far more frequent than other members of the profession are prone to realize, and there is no part of the body where a focus may be more securely hidden from the detection of the casual observer.

The methods by which symptoms are produced from this localization, as elsewhere, are by absorption of toxins, and by the invasion of the blood stream by bacteria, with secondary localization. Positive blood culture can be obtained in many cases of acute sinusitis, and symptoms of infection in remote parts may appear very early. In severe cases, a septic thrombosis of veins in the neighborhood may produce a thrombosis of the cavernous sinus. This does not lead to the usual pyemic process with metastases, as the patient dies of meningitis before such a process has time to occur. The spread of infection by the lymphatics is not usually manifest unless there is coincident involvement of lymphoid tissue in the throat and pharynx. There may, however, be extension to the meninges by this route. I once saw a case of meningitis with streptococci in the spinal fluid from a sinusitis, recover after a radical operation on the sinuses. This was probably a case of extension through the lymphatics. In certain very acute cases where an osteitis is present, a true pyemia

may occur with localized collections of pus in other parts. This is most likely to happen from an acute antrum involving the superior maxillae in children.

Let us now consider the general effect on the patient from absorption in acute infections in this region. This picture presents as variable manifestations as could only be possible in such a variable anatomical field. Thus if there is free drainage, there may be very few general symptoms—fever may be only one or two degrees, and the pulse may be very little above normal. On the other hand, with insufficient drainage, especially in one of the larger sinuses, the phenomena of a very acute infection may be present. I have seen the general effect of a blocked sphenoid more pronounced than I have ever seen it from other sinuses.

The more severe general symptoms are only present during the first acute attack as a rule, and when one gets grave general symptoms from an acute attack grafted on an old, chronic sinusitis, it is well to consider the possibility of complications. Acute sinusitis with inadequate drainage continuing on through a subacute stage without much to call attention to the localization, may produce a train of symptoms which have led to confusion in diagnosis with such infections as a paratyphoid, and most commonly, tuberculosis. I have seen numerous instances where the latter has been given as a diagnosis where all the symptoms were coming from the nasal sinuses, and disappeared entirely on treatment. I always feel the necessity of warning our friends who are distinctly otologists to look out for symptoms from the nasal sinuses, when cases are not recovering satisfactorily after a mastoid operation. The differentiation between infections in the sinuses and tuberculosis can often be made by the simple expedient of keeping a four hour temperature and pulse chart. The slight elevation in temperature in sinusitis will not show the regular evening rise of tuberculosis, and will not show the rapid pulse rate so common in all tubercular lesions. Malignant endocarditis is another condition easily confused with sinusitis, especially in its early stages. The two conditions may be coincident and related as cause and effect.

We will now pass on to consider the chronic inflammations of the sinuses, and these constitute by far the majority of the focal infections as we see them. This is usually considered to mean a collection of pus in one or all of the sinus cavities. A small involvement may produce as marked an effect as an extensive involvement, the nature of the drainage being the determining factor in the production of symptoms. The amount of pus does not seem to matter

much, and in some cases with very slight secretion, the mucous membrane itself can constitute a focus from which toxic substances can be absorbed, and produce symptoms, or where the membrane has completely degenerated, and the sinus contains areas covered with granulation tissue, there is no doubt that absorption takes place. The diagnosis of some of these pathological processes in the sinuses presents great difficulties.

The history is a matter of great importance, and many times it gives us about the only evidence. A history of a severe, acute attack at any time in a patient's life may have great significance. Repeated acute attacks are still more suggestive. Attacks of tonsillitis have also some bearing on the possibility of a latent sinus focus, or the association of an infection in the tonsils with a postsinusitis is very common. An acute infectious disease such as influenza, pneumonia or scarlet fever may have initiated the sinus infection, so all this data should be carefully recorded.

A very careful examination of the nasal cavities must be made in every case—the details of such an examination are known to you all. A steady use of the pharyngoscope will occasionally yield valuable evidence, and should not be omitted, and in particular insist on more than one examination before committing yourself to a diagnosis. Bad anatomy in a nose producing blocked drainage in the region above the middle turbinates affords one some circumstantial evidence in favor of a positive finding. A culture may show one dominant organism, and the individual may show sensitization to the injected protein from this culture. If the patient has no temperature record, this should be taken at four-hour intervals for several days. The washings from an antrum, if pus is present are positive evidence of infection, but when negative, it does not absolutely deny the presence of a focus, for there may be quite marked degeneration of a membrane with polypi, and one will get no pus on irrigation. The X-ray and transillumination will help in these cases as well as the history. The X-ray is always valuable, but must not be wholly depended on, especially in disease of the posterior ethmoids and sphenoid. It is in this region that the pharyngoscope is most valuable if it is accessible, and if it is not accessible on account of the anatomy, it is "a priori" evidence that there may be a focus present. In my experience the frontal is very rarely acting alone as a focus of infection, but one can usually determine if pus is coming from the nasofrontal duct. The attempt to wash it out has not always been successful with me.

Having determined with certainty, or as it happens too often, with probability, the presence of a residual focus, our next problem is how to deal with it, and this will necessitate a general review of the whole treatment of sinusitis.

Considering that every acute attack bears potentialities of an aftermath of trouble, we must do all we can to promote the complete restoration to normal before discharging the patient. By far the majority of acute coryzas have involvement of sinuses, and in the free, open nose with good drainage, recovery will take place spontaneously. The cases which ask our advice in the first forty-eight hours of an acute sinusitis are not very numerous, but when they do, I think the best thing to do is to forget that we are specialists, and give them about the same treatment the family doctor would give, viz.: a good physic, rest in bed, Dover's powder with a little phenacetin and belladonna and caffein, easily digested food and fruit juices. He will probably suggest dropping some argyrol in the nose with a medicine dropper, and this would be about all the local treatment which would be justifiable.

After three or four days, if there is a pronounced purulent discharge, warm saline irrigations may be given, used preferably with an irrigator on one side and a vacuum producing apparatus on the other. This may be followed by placing the patient in a horizontal position, tipping the head far back and dropping in some freshly prepared, 10 per cent argyrol. This would be about the routine treatment for cases seen also in the subacute stages. No operative interference is advisable in the acute stage. One may sometimes have to puncture an antrum, but even this is only indicated after a week or ten days when there is no evidence of drainage, and pain persists. Likewise, a frontal showing no drainage and persistent pain may require some attempt to promote drainage. This will consist in removing the anterior end of the middle turbinates, or doing a limited submucous.

In the subacute stage, after a short trial of treatment, any anatomical condition interfering with drainage will require correction. A complete submucous with or without partial removal of the middle turbinate will be sufficient usually. Occasionally the judicious use of the actual cautery, or chromic or nitric acid, will greatly facilitate drainage where the turbinates have become spongy. At the same time, if there is an obvious infection in the tonsils or adenoid tissue, these should be removed. Sinusitis in children and young adults will very often clear up after the removal of tonsils and adenoids. If, however, the condition is not making progress towards recovery

at this period, and even previously, general treatment should be insisted upon, a diet rich in fats with fruit juices and fresh vegetables, bodily rest out of doors with plenty of sunlight—about the same regimen as one would prescribe for a tuberculosis patient. Tuberculosis is in fact about the only focal infection which is treated intellgently, because in this one does not trust to local measures, but has to depend upon the general body resistance to effect a cure. If, however, in spite of all such measures, a profuse discharge continues, and the X-ray shows an involvement of antra and breaking down of ethmoid cells, an intranasal sinus operation should be done at once. No one today allows an acute ear to go on with a purulent discharge into a chronic state, neither should they allow this to occur in the nasal sinuses. Free intranasal drainage of the antra and sphenoid should be established, and complete exenteration of the ethmoids should be done. If the anterior ethmoids are properly cleaned out the frontals will usually take care of themselves.

In the cases which are first seen when they have reached the chronic state, the above outline of procedure should be followed. If, however, in both stages, such procedure causes no amelioration in the symptoms caused by such a focus, one will have to soon resort to more radical measures. A Caldwell-Luc may have to be done on the antra, and a radical frontal sinus operation performed. The sphenoid will have to be opened low into the nasopharynx, and possibly a radical operation such as I will describe later may have to be done.

In following this treatment of these foci in the sinuses, one usually finds, that with any degree of improvement which can be accomplished in the local condition, there is some improvement in the secondary condition, in an arthritis, a nephritis or whatever part is affected, but until one has entirely exterminated the original focus, they will be subject to relapses, and many of our efforts may appear failures because either the patient or doctor becomes discouraged and gives up.

This is the most difficult surgical field of the whole body, and to completely eradicate a focus involving all the sinuses is a long drawn-out affair, in which one has to employ every possible adjunct. Vaccines, I think, help in some cases, in others they do not, but they are worth trying after one is sure they have established good drainage. The various antiseptics which are recommended seem to have little effect in my experience. I believe that argyrol has a beneficial effect, not for its antiseptic value, but for the stimulation of tissue reaction it may produce against bacteria. In a region such as the eye, where

effects are more easily observed, there is no doubt that argyrol exercises a beneficial action. A method of using argyrol which has been called the Dowling method, consists of packing pledgets of cotton dipped in 10 per cent arygrol in the nose, and leaving them there for an hour, and has been very highly commended by those who have used it persistently. Placing the patient in such a position that gravity will carry the argyrol into the sinus region, seems to me to give some result in many cases.

Operative procedures on the nasal sinuses vary greatly according to individual cases. In most cases a submucous has been done before the sinuses themselves are attacked. If it has not, it should always be done as a preliminary. To have a flexible septum, not only gives one much better access to the operative field, but it enables one to carry out after-treatment much better; besides it facilitates the prevention of adhesions forming afterwards. The intranasal operation is the method of choice where there is no indication of bony necrosis nor external frontal fistula. Of course where there is polypoid degeneration throughout all the sinuses, an external radical may as well be done at once. The various methods of radical operations are no doubt familiar to you all. In the case of the frontal, I usually prefer to pack the wound externally till it has filled up from the bottom in small sinuses, but in very large ones I leave a bridge and close the wound, maintaining pressure with the dressing to obliterate the cavity. In the operative procedure on the sphenoid, one encounters great difficulty in getting dependent drainaige. Occasionally it becomes necessary to take off the floor to establish drainage into the nasopharynx. In two cases where both sides were involved, I took out the partition between the two, and took off the floor. This was rendered imperative in these cases by the fact that their sphenoids had been scraped out, and kept filling up with granulations, maintainng a focus which could never heal. In one, the granulating walls had united and left a blind cavity in the bottom, an ideal focus of infection. This operation, which you may call the radical sphenoid operation, is not so difficult. The nasal septum must be removed and cut through near its posterior border, then pushing it to one side, a fair exposure is possible. It could be done between the layers of the septum in the same way, as Cushing exposes the pituitary gland.

The operation on the ethmoids must needs be always a complete exenteration, for one cannot establish drainage in individual cells, and could not probably tell which ones to drain even if it were possible to do so. In purely local conditions, one may occasionally

operate on the anterior group of cells, and in cases of retrobulbar neuritis an operation on the posterior cells may be all that is necessary, but where a focal infection is found or suspected, it will be always wiser to exenterate the whole group. The question of removing the middle turbinates in doing an ethmoid operation is frequently discussed. My experience would compel me to believe that it is necessary to remove it in nearly all cases if one expects to eradicate the focus entirely and create proper conditions for the space to close over with a healthy epithelial covering. I have used a method of operating on the ethmoids for years which is a modification of the Mosher method, but carried out with special instruments devised on the safety first principle, and I can testify from a large experience with cadavers, that they are perfectly safe and at the same time will open all the cells. The after-treatment requires considerable care, granulations must be kept in good condition, and as they are very prone to become exuberant, it is often necessary to scrape them off, or take them off with a biting forcep. If, after an intranasal operation a profuse discharge continues from the frontal, it is almost impossible to obtain a healed surface in the ethmoid region and the infection will continue till a radical frontal is performed.

101 East 58th Street.

OSTEOMA OF THE FRONTAL SINUS EXTENDING INTO THE ORBIT AND ANTERIOR CEREBRAL FOSSA.*

Dr. Henry M. Goodyear, F. A. C. S., Cincinnati.

The following patient, Mr. A. C., age 32 years, was referred to me by Dr. Henry Stanbery on Sept. 15, 1924. There was evident an undue bony prominence over the right frontal sinus. The eye was displaced downward and outward. The vision was normal and the eye-grounds clear. The excursions were not limited.

The patient complained of terrific headache, and felt as though the right side of his head was being pressed in a vise during the attacks. The tumor mass in the orbit was first noted two years ago, and had increased slowly in size. At first the headache was mild, but during the past three months had become intensely painful. There was no history of dizziness or vomiting. The patient was well nourished

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and apparently in good general health. The blood Wassermann was negative.

An X-ray (Fig. 1) revealed a large tumor mass practically filling the entire right frontal sinus, which was large. The mass also extended into the orbit; to the midline of the frontal region; laterally into the temporal bone, and posteriorly in the right anterior cerebral fossa (Fig. 2).

The intranasal examination showed the right side to be apparently normal. There was some hyperplasia in the left anterior ethmoid area.

Under local anesthesia a curved incision was made through the eyebrow and down on the side of the nose, and the periosteum to-

gether with the attachment of the superior oblique muscle was elevated and the eye retracted laterally. Another incision was made upward near the midline of the frontal sinus wall and a large bony tumor mass was exposed. A part of the anterior frontal sinus wall had completely atrophied.

With chisel and rongeur the surrounding bone was cut away sufficiently to elevate the tumor mass, which seemed to originate in the upper lateral wall of the sinus. The entire roof of the orbit was removed and the intermediate wall of the two frontal sinuses was found to have been completely absorbed. There was evident much thickening of the membrane in the left frontal but no pus. As the

tumor mass was lifted from its bed a large area of dura the size of a half dollar was exposed, showing a marked depression in the frontal lobe. There was no loss of cerebrospinal fluid. The nasofrontal opening was enlarged, the wound packed loosely with one-half per cent iodoform gauze and the incision sutured.

The patient showed very little reaction after the operation. The sutures were removed in 24 to 36 hours and the packing completely removed by the sixth day. The patient left the hospital on the eighth

day, and since the operation there has been no recurrence of headache and no undue secretion from the nose.

The tumor was of almost ivory hardness and its surface rough and nodular (Fig. 3). A microscopic section showed it to be a benign tumor.

I wish to state that the entire operation was done under local anesthesia, and at no time did the patient seem to be unduly uncomfortable except for a moment at the time of elevating the tumor mass from the anterior fossa.

Doctors' Building.

SUBLINGUAL TONSILLAR ABSCESS. LINGUAL QUINSY.*

Dr. Margaret F. Butler, Philadelphia.

Modern textbooks and particularly those by American authors, make but slight allusion to the lingual tonsil, the fourth portion of Waldeyer's ring. Of eighteen textbooks reviewed less than half of them refer to the phlegmonous lesions occurring in or under it, and the majority of these are in English and German works. Even Bosworth's classic refers only to hypertrophy and varicosities of the lingual tonsil, leaving the student unaware of the serious complications which may arise from it.

According to Lennox Browne,[1] the first historical notice of the lingual tonsil was made by Vesalius in 1543. Wharton in 1685 improved upon his description of it. Schaffenberg (1704) and Morgagni (1765) refer to it, but it was not until 1852 that it was recognized as being similar to the other tonsils. In 1892 Mr. Wyatt Wingrave in England, and Rosenberg in Germany arrived at the same conclusion, viz: that though the two parts of the tongue are in immediate connection, the base differs completely from the anterior portion, anatomically, physiologically and pathologically.

In 1880 Kronenberg made the following statement: "Certainly to Lennox Browne is due the merit of having decidedly demonstrated that the complication of symptoms, which has been called globus hystericus, and which up to then had been considered the expression of a functional neurosis, are frequently due to real anatomic changes in the region, which had been overlooked because examinations had been incomplete."

The most satisfactory contribution that I have found regarding the lingual tonsil is the chapter in Dr. Paul Heymann's "Handbuch der Laryngologie und Rhinologie", 1899, entitled "Die Krankheiten der Zungentonsille von Dr. J. Michael in Hamburg".

Lennox Browne also makes an exhaustive study of the subject.

The histology of the lingual tonsil has not received so much attention as has that of the other tonsils. Wyatt Wingrave and Kölliker have furnished valuable contributions to the subject. Ruault states that the anatomical barriers of the lingual tonsil are very definite, extension of disease therefore is rare. The gland is intimately connected with the lingual muscle, the essential muscle of the tongue. Histologically it resembles the faucial tonsils, but the cellular tissue is more dense and skeletal muscle fibres are plentiful.

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*Reference to scant attention given to study of lingual tonsil in recent American textbooks. Review of history and literature. Report of cases of sublingual tonsillar abscess.

It is probably the exception rather than the rule for the general practitioner to examine the hypopharynx in diseases of the throat, and many pathological appearances in this region are frequently overlooked.

Early in practice the laryngologist finds secretion in the crypts of the lingual tonsil accompanying acute inflammations and at times mycosis or keratosis, hyperplasia, atrophy, edema, and varicosities. We know that gummata, papillomata, cysts, various forms of tumors, benign and malignant, may be found here.

The hyolingual duct may remain patent and be traced from the foramen caecum in the sulcus terminalis to the middle of the thyroid gland and may carry infection thither, and dermoid cysts may develop from the foramen caecum.

Foreign bodies such as fish bones and husks lodge in the lingual tonsil fairly often and it is surprising that we so rarely have abscesses arising from this source.

Lennox Browne,[2] 1899, gives a very comprehensive description of abscess formation under the lingual tonsil. He quotes David Craigie who, fifty years previously, now seventy-five years ago, had described under the name lingual quinsy "an acute inflammation of the tonsil and base of the tongue, apparently a very grave disease, for one of the patients whom he saw died and three or four others who were exceedingly ill, made but a slow recovery."

Several writers state that if the suppuration extends to the floor of the mouth it may be mistaken for or constitute Ludwig's angina.

Dr. Justin Waugh[3] reported a very interesting case of lingual quinsy at the meeting of the American Academy of Ophthalmology and Oto-Laryngology in 1923. In his paper he made this statement: "There have been very few references to this disease in the literature, and although I have made frequent inquiries among men interested in oto-laryngology, I have encountered only one who has had personal experience with a case similar to that reported", and followed with a case reported to him by Dr. Thompson, of Manchester, England.

Case report: Aug. 31, 1923, I was called early in the morning to see a man who was said to be choking and was apparently in great distress. I directed that he be taken to the Woman's College Hospital, a square from his home. On my arrival I found the patient, F. L., a stout, well built man, age 34 years. He was suffering from obstruction in the throat, severe pain, dysphagia and dyspnea. The condition had been developing for two weeks, beginning with sore throat, growing steadily worse. He had had pain in

the left ear for the past few days. His voice was thick, he breathed with difficulty and I surmised that he had a peritonsillar abscess.

On examination I found considerable swelling externally at the angle of the jaw and in the sublingual region to the left side. The patient opened his mouth with less difficulty than with peritonsillitis and to my surprise I found no pathology of the fauces with the exception of extreme redness and swelling of the left lateral fold of the pharynx.

With use of the tongue depressor and later with the laryngeal mirror I found a bright red mass as large as an English walnut filling the left side of the throat. On cocainizing and palpating the mass it seemed to be attached to the whole of the left side of the base of the tongue. It gave the fluctuating sensation of an abscess. An incision was made and a great deal of thick yellow pus gushed forth and the patient was immediately relieved. Later, examination showed that there was edema of the epiglottis and swelling of the left aryepiglottic fold, ventricular band and arytenoid. At the end of a week the tumefaction at the base of the tongue had practically disappeared. Two weeks after the abscess had been incised I was called by the patient and was informed that the abscess was filling up again, but that he was not suffering so much as previously. I had him come into the hospital and I found a mass much like the one found two weeks previously, but not quite so large. The tumor-like swelling was in good form to be removed and after cocainizing, a large mass was cut off with the wire loop.

The tissue removed consisted of hypertrophied lingual tonsil and was three-fourths to one inch in diameter and about one-half inch in thickness. There was a thin, pale, capusular membrane covering its lower, lingual surface. The patient had no further trouble.

In the case reported by Dr. Waugh, the pus invaded the deep tissues of the tongue and throat and after seven days the patient died from exhaustion. "The pathological specimen" secured post-mortem, "showed the presence of an abscess at the base of the tongue of approximately the size of an English walnut, lined with a greenish sloughing wall, and definitely connected with the base of the lingual tonsil on the left side."

In the discussion following Dr. Waugh's paper, Dr. Herman Cohen, of this city, Dr. W. W. Carter, of New York, and Dr. Pollock, of Chicago, each reported cases of sublingual tonsillar abscesses.

Dr. Cohen has very kindly turned over to me the reports of his cases. They are as follows:

THREE CASES OF SUBLINGUAL TONSIL QUINSY.

September, 1917: G. M., male, age 22 years, moulder. History of tonsillitis ten days before I examined him. After his tonsillitis

subsided, he continued to have odynphagia, which was steadily getting worse. His family physician had ordered hot gargles with no beneficial results. When he came to see me he remarked in the presence of his wife "that unless he was given relief he would commit suicide". Examination revealed an inflamed and swollen posterior third of the tongue, very sensitive to the touch, edema of the glosso-epiglottic space and of the epiglottis and diseased tonsils. There was no evidence of a retropharyngeal abscess or a Ludwig's angina. Under local anesthesia I made a deep incision into and through the right lingual tonsil. Pus immediately oozed out. Hot alkaline gargles were ordered and medicated inhalations also. The following day the patient made the following remark, "He decided to stay in this world a little longer."

May, 1922: B. P., male, carpenter. History of nine days of dysphagia, not preceded by tonsillitis but came on suddenly. Earache and odynphagia followed with increasing intensity. Was in one hospital where he was kept for two days and having had no relief he insisted on being sent out. Another physician sent him to a second hospital, where again he remained two days and then insisted he be sent home. A third physician asked me to see this patient and at this examination the patient had about ten days growth on his face, emaciated and in a word looked like a tuberculous patient. There was swelling, marked tenderness in the posterior portion of the tongue, particularly on the right side, also considerable edema in the oro- and laryngo-pharynx of the right side. Incision through the right lingual tonsil with a curved knife released considerable foul smelling pus and the next day the patient wished to go home because the nurses were not giving him enough to eat.

May, 1923: P. L. B., male. History of sore throat but no tonsillitis. Duration four days and odynphagia was increasing. Findings were about the same as in case two except not quite as bad. Incision at and through the anterior border of the right lingual tonsil permitted considerable (about two teaspoonsfuls) of pus to ooze out.

All three made rapid recoveries as is seen in peritonsillar (faucial) abscess.

ABSTRACT.

1. LENNOX BROWNE: The Throat and Nose and Their Diseases. 1899, p. 382.
2. Ibid. p. 386.
3. JUSTIN M. WAUGH: Tr. Am. Academy of Ophthalmology and Otolaryngology, 1923, p. 313.

1831 Chestnut Street.

PEMPHIGUS AS A BEGINNING TONSILLAR MANIFESTATION.*

Dr. Henry Dintenfass and Dr. Sigmund S. Greenbaum,
Philadelphia.

Dermatologists are in general accord regarding the condition referred to as pemphigus, but in the minds of many practitioners the significance of the term pemphigus is not clear. Originally pemphigus (bleb) referred to all diseases in which blebs occurred, but, as blebs in themselves do not constitute a definite disease and as the true nature of many diseases characterized by bleb formation became known and understood, these latter were removed from the general group of pemphigus. Among them were the bullous syphilides (pemphigus neonatorum syphiliticum), bullous impetigo (pemphigus neonatorum contagious), bullous erythema multiforme (pemphigus circinatus), epidermolysis bullosa (pemphigus congenitalis), and many instances of Duhring's disease (pemphigus pruriginosus).

At the present time, the term pemphigus is restricted to pemphigus acutus (a severe, frequently fatal disease) pemphigus chronicus or true pemphigus, pemphigus vegetans and pemphigus foliaceous. It is very probable that the latter two conditions are but later stages of true chronic pemphigus. Further, when the term pemphigus alone is used, today, it generally refers to chronic pemphigus.

Pemphigus is a slowly progressive and usually fatal disease. Its downward trend is accompanied by marked mental depression, anorexia, fever, vomiting, diarrhea and loss of weight with death in from three to eighteen months. Although relatively rare, it is, by reason of its lethal character, one of the most important diseases with which the dermatologist comes in contact. In our experience, pemphigus terminates fatally in about 90 per cent of the cases. Of twelve patients admitted to the Polyclinic Hospital in the service of Dr. Schamberg from January, 1922, to date, suffering with pemphigus, all but one died within periods varying from three to eleven months; the tenth passed into the form of pemphigus foliacous and is alive at the present writing. Without going into clinical

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description of the disease, it is well to remember that the following are considered evidences of severity in a given case: Primary appearance of the eruption on the mucous membrane; tendency of the epithelium to desquamate or of the epidermis to separate upon

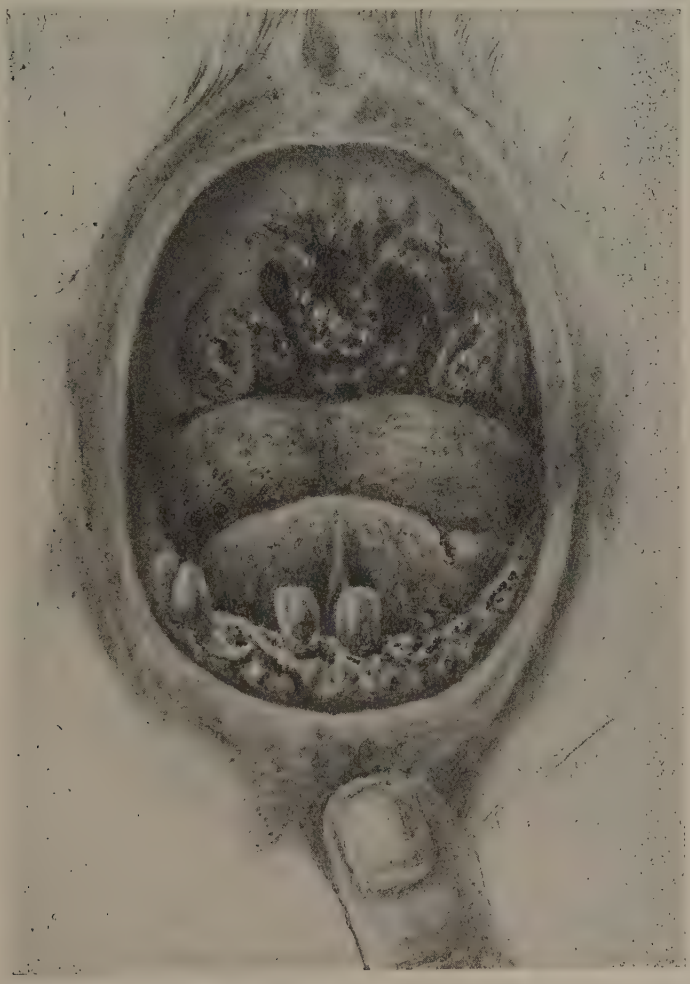

Fig. 1. H. H., white, male, Jewish, age 55 years. Pemphigus beginning on left tonsil, later involving other tonsil, pharynx, gums, tongue and buccal mucosa, at which time picture was made. Duration of condition, three months. (This is Dr. H. D.'s case described in the above article.)

the slightest trauma (Nikolski's sign); and lastly, the appearance at times of condyloma-like elevations on the skin suggesting pemphigus vegetans.

Although the initial manifestations of pemphigus on the skin and mucous membranes are the same, the clinical appearance on the

mucosa is somewhat different because of the localization. Here, as a result of the heat, moisture, and great tendency to trauma, the blebs are rapidly destroyed, sometimes within half an hour. All that one usually sees, therefore, are rounded or polyclinic (if several adjacent blebs are present) red erosions sometimes covered with a diphtheroid membrane representing the fallen bullous epithelial roof. In so grave a disease a diagnosis of pemphigus when but the mucous membrane lesions alone are present, is in most instances unjustifiable, though it must be recognized that a pemphigus limited to the mucous membranes exists. Aside from the conditions noted in the case report, one should be careful to exclude bullous eruptions of the mouth due to certain drugs, notably iodids, aspirin, and antipyrin; erythema multiforme which is, however, usually acute in its onset, and associated with cutaneous manifestations, and finally Duhring's disease, which is likewise accompanied by cutaneous lesions.

It has been suspected for a long time that pemphigus was an infectious disease. Various organisms, including bacilli, diplococci and streptococci, have been isolated from the blood by different investigators. Eberson has recently recovered a bacillus from the blood which he regards as a causative organism. Careful and repeated studies made during the past year in the Research Institute of Cutaneous Medicine by a group of men have resulted only on one occasion in the finding of a bacillus similar to that described by Eberson. On other occasions streptococci have been isolated.

Despite the usual prognosis, an early diagnosis would appear to be of great value. The recent observations of one of us (S. S. G.) appear to indicate that certain drugs being developed at the Research Institute of Cutaneous Medicine may exhibit their greatest value in beginning cases.

Our purpose in presenting this case before the Society is to point out that in the various conditions affecting the tonsil and producing throat soreness, this disease must not be forgotten.

Pemphigus vulgaris, as has already been noted, is an inflammatory disease of the skin characterized by the formation of round or oval blebs and as has been said, these frequently appear on the mucous membranes of the mouth and other mucusal surfaces. Dr. Goodfriend recently reported a case of this type in the *Dental Cosmos*. Some months ago, Dr. Henry Wieder treated a similar case.

Both of these patients were in the Polyclinic Hospital, and were included in the list already given. The case we are about to describe was one in which the affection appeared on the tonsil, without the

skin changes being present, and was the sole clinical manifestation of several weeks. This is of particular interest to the laryngologists because until the blebs on the skin made their appearance we were absolutely at sea as to the diagnosis. The history is briefly this: Mr. H. H. was sent to one of us for a difficulty in swallowing which had been persisting for several weeks. Except for extreme nervousness and constant salivation there was nothing unusual to be noticed from his external appearance. He was quite robust, although he believed that he had lost some weight recently. He was married, and the father of three healthy children. His wife had had no miscarriages. He denied venereal history.

In the examination of the throat there was disclosed a distinct swelling of the left tonsil and peritonsillar region not unlike quinsy, but with the mucous membrane of a fiery red color surrounding a gray area on the mesial aspect of the tonsil about the size of a dime. The uvulae was also considerably swollen and of the same red character.

Thinking that this was probaly one of the throat infections which were prevalent in the recent grippe epidemic, hot alkalin gargles were prescribed and he was ordered to come back in several days. On his return and thereafter for about two weeks the condition appeared the same. At the end of this time, however, there was a decided change for the worse. There was now an involvement of the right tonsil similar to that of the left tonsil. The gums were spongy, and bled quite freely. The tongue was coated but its edges and tip were quite red. There was no glandular swelling under either angle of the jaw. The Wassermann test was taken but proved negative for lues. Smears from the mouth and throat showed no evidence of Vincent's angina. The situation was quite puzzling.

We decided to put the oral cavity in the best possible hygienic condition and at the same time to build up the patient's health and strength. Meanwhile he became progressively worse. The redness and swelling of all the tissues of the mouth increased. The pharynx, the gums, and to some extent the tongue, presented grayish patches of erosion surrounded by red areola. The appearance of the gums suggested the possibility of stomatitis of the apthous or scurvy type, but the mode of onset and the history of the case precluded this. Five weeks after our first observation we had not arrived at a diagnosis. The extreme redness of the mouth and pharynx gave one the impression of a toxemia of some sort, even though

there was very little temperature. Another smear for Vincent's disease and another Wassermann threw no light on the question. It might be said, however, that there was too much redness of the mucous membrane and too much pain to be a typical syphilitic condition; as there was also too little ulceration to be really like a Vincent's angina, but with the above laboratory help and the fact

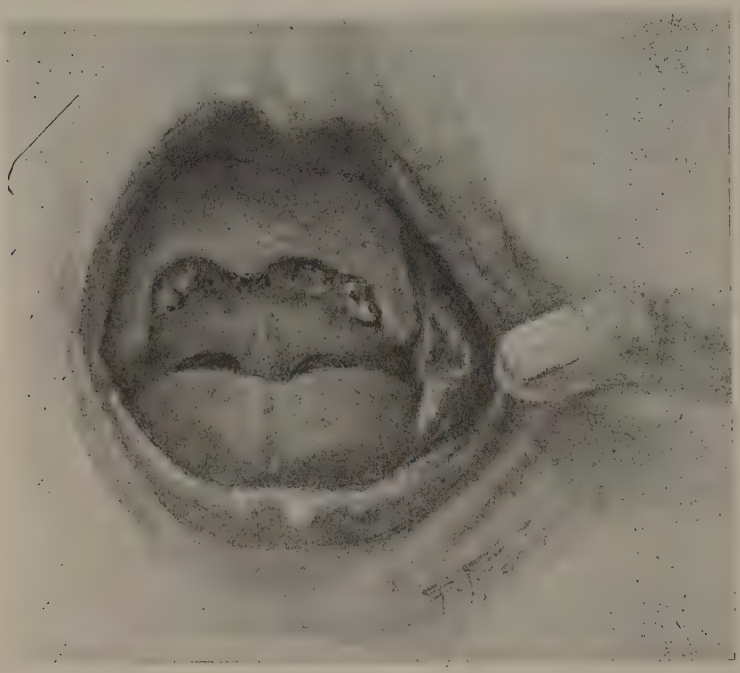

Fig. 2. White, female, age 32 years, Jewess, American-born. Pemphigus limited to mucosa (roof of mouth and eyes). Condition roof mouth Oct. 2, 1924. Duration of affection at this time, five years. The large yellow (on left) and the two smaller yellow areas (on right) represent recently ruptured blebs. The rest of the soft palate is a continuous erosion, the result of repeated bleb formation and a final inability of the superficial cells of the mucosa to reform. (This is a private case of Dr. S. S. Greenbaum, in which dermatological manifestations appeared before the mouth condition, put in to show the similiarity of lesions to Fig. 1.)

that there was no glandular involvement they were definitely excluded.

At this time when, we had almost given up as hopeless the discovery of the true state of affairs, the patient himself called our attention to a large blister that had appeared on his chest. On examination a bleb was disclosed and a provisional diagnosis of pemphigus vulgaris made. The man was referred to Dr. Greenbaum, of the skin clinic, who confirmed this diagnosis. This imme-

diately was the solution of the difficult question of the pharyngeal and oral condition. It proved that the beginning tonsillar manifestations were but the signs of a general systemic infection.

This case is of especial interest to nose and throat men, particularly because it showed, that without the lesions on the skin being present, the diagnosis could not have been made.

Since the prognosis of this disease is practically hopeless it should serve as a reminder that all rosy predictions in suspicious cases should be carefully guarded against.

It is instructive because in the range of possibilities of throat conditions pemphigus should not be overlooked.

1714 Pine Street.

HEAD INJURY FROM AN AIR RIFLE; OPERATION AND RECOVERY.

Dr. James A. Morgan, Honolulu.

H. C., Portuguese, male, age 6 years; while at play six months ago was shot by a B.B. lead shot discharged from an air rifle. The shot struck the little patient at about the center of the glabella and just below the junction of the superciliary ridges. X-ray at this time showed penetration of the shot into the frontal sinus in midline, fracture of the septum of frontal sinus and lodgment of the shot in posterior wall.

There were no untoward symptoms at the time, and the patient was seen every day during the subsequent month.

Six months after the accident the child fell, striking the side of his head on soft soil. The following morning the mother noticed a slight swelling over the frontal sinus region about the scar where the shot had entered the skull. At the same time, he seemed to have a slight coryza with excoriation of the alae nasi. The coryza con-

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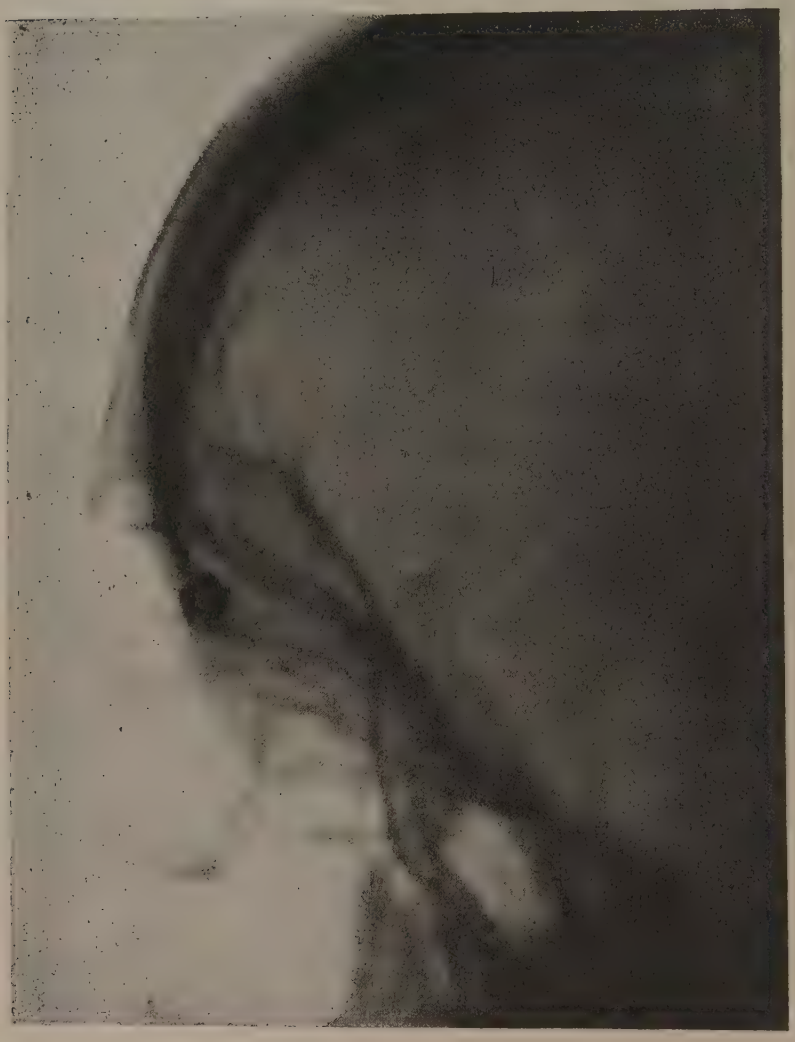
tinued during the next week and the mother noticed an increase in the swelling in the forehead, disturbance of sleep and the rise of temperature.



At this time an X-ray was taken, which showed clouding of right frontal sinus and an opalescent foreign body imbedded in posterior plate of right frontal sinus.

The frontal sinus was opened through the right eyebrow and found to be filled with pus and beginning polyp formation was noticed. The lead shot was found in the posterior wall of the sinus and resting on the meninges. The shot was removed with considerable difficulty on account of its small size and that it was imbedded

in the bone. The posterior plate was cut away sufficiently to loosen the shot for removal.

There was a postoperative rise of temperature of 1°, which did not persist after the drain was removed from the frontal sinus. Subsequently the little patient made an uneventful recovery.

MAXILLARY SINUSITIS OF ORAL ORIGIN.*

Dr. Henry Sage Dunning, New York.

On account of the great developments made during the last few years in oral radiology, and the frequency with which Roentgenograms of the teeth and maxillae are made, maxillary sinusitis of oral origin is found to be a very common disease. For many years, rhinologists have felt that the maxillary sinus was surely their domain, as they have thought in the past that anywhere from 70 to 90 per cent of all maxillary sinus infections were descending infections from the frontals or ethmoids or from the nose itself. I believe that the rhinologists today feel that there are more ascending infections from the mouth involving the antrum than were formerly recognized, but that still the larger percentage of infections of the maxillary sinus come from above downward.

Most of my oral surgery friends feel that the percentage of antral infection of oral and nasal origin is much nearer 50-50. That there are ten teeth in the upper jaw, two bicuspids and three molars, right and left, and also gingival margin to infect the antrum we of course might say that the oral surgeon sees more of these cases originating from the mouth, and that the rhinologist sees more springing from the nasal accessory sinuses. In these days when so many patients are having their teeth radiographed as a matter of routine whether they are in trouble or not, latent antral infections are found, and many teeth are removed whose alveoli enter the antrum on gentle currettage. On the removal of many of these teeth, it is found that there is a chronic low grade infection present in the antrum that has been draining comfortably through the middle meatus for months. This mild infection has taken care of itself very nicely, and the condition has not become acute. We are today giving a great amount of thought to the dental and peridental structures and to the maxillary bones. We are ever on the lookout for bone cysts, neoplasms, impacted teeth, necrosis and infected areas, etc. Few teeth today are extracted by the careful practitioner without being radiographed first. The condition of the bone is known and the bone is often curetted and rongeured *even though the antrum is opened.* If the antrum is opened it should be immediately irrigated while there is good anesthesia, for diagnostic purposes. This procedure tells the operator at once the condition

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of the antrum and often saves the patient a subsequent antral washing to learn whether or not the sinus is infected.

I have had many cases during the last year in the hospitals and in private practice in which I have had to make a wound in the maxillae that has caused the mouth to communicate freely with the antrum. In many cases, the antrum has been found to be infected, although there were no symptoms before operation. When the operator has by force of circumstances made a good sized oral opening into the antrum and has found the antrum diseased, there are two main factors in the subsequent treatment which should appeal to him. These are: *1*, cure of the antral disease as soon as possible, and *2*, closure of the communication between the mouth and antrum at an early date.

If we study the physiologic function of the maxillary sinus, and also its anatomy, we find that the antrum was intended to communicate normally with a comparatively clean cavity, the nose: that the nose and the antrum are lined with the same membrane, and that about the same bacteria are found in these two cavities, the nasal and the maxillary sinus. It is evident to the casual observer that nature never intended the mouth and the antrum to communicate, and never intended the mixing of their different bacteria and secretions. It has been proved clinically that a permanent opening from the mouth into the antrum may produce an ascending infection into the maxillary sinus, later causing a pansinusitis; yet how often do we see the antrum, in these chronic infections of oral origin, irrigated for weeks through the opening in the mouth and packed with gauze? Why should a large oral opening into the antrum be permitted to exist? The mechanics of this treatment is wrong. It is analogous to the housemaid sending her sweepings from the cellar through the parlor with its dainty hangings rather than sending the dust from the parlor, a comparatively clean room, through the cellar, generally not too clean, to the back yard. A gauze drain inserted into the antrum from the mouth often draws up secretions from the mouth by capillary attraction as does a wick in a lamp, and frequently reinfects the cavity one is trying to cleanse. Up to a few years ago text-books were advocating the extraction of a tooth through which to treat a maxillary sinus infection. These books did not stipulate the removal of a diseased tooth that was causing the antral infection, but often a healthy one for drainage purposes only. The sacrifice of a healthy tooth in the old days meant nothing and the establishment of the communication between two cavities containing different secretions and bacteria met with the approval of most sur-

geons. This method, known as Cowper's, is not advocated now by many authors, although it is often mentioned. The etiology of maxillary infections in the past has not been carefully considered. Not a month ago a case came to me of maxillary sinusitis for which someone had just performed a radical antral operation. I was told that there was "a sort of 'gum boil' over the second bicuspid", and was asked to treat it. My radiographs, dental films, disclosed a decided shadow extending to the antral floor over the second bicuspid, which was a non-vital tooth. Under procain I removed the tooth, and the curette entered the maxillary sinus very readily. On exploring the so-called "gum boil" above the tooth, I found it led to necrotic bone. Most of the alveolus of the offending tooth was removed and an area of dead bone as large as a penny was removed from the anterior wall of the antrum just above the alveolar process after a flap of the soft tissues had been turned back. I do not believe that this case was properly diagnosed in the beginning before the first operation. There was some diseased membrane over the end of the infected bicuspid, and I am quite sure that the antral infection would not have cleared up in many months, if ever, without some surgical treatment having been given to the infection of the alveolar process.

This type of infection should be diagnosed early, before treatment is begun, and this cannot be done accurately without taking oral Roentgenograms in conjunction with the anteroposterior plates showing the sinuses. If the infection is a descending one from the frontal or ethmoid sinuses, the case naturally should be treated by the rhinologist, and in some cases by the oral surgeon, if he is familiar with the above sinuses. If the infection is an ascending affair from the maxillary bones and teeth, it cannot be cured alone by the rhinologist unless he is familiar with the mouth and dental structures. In either of the foregoing cases, the cause of the infection must be removed; and if the case is a chronic one, the antrum should be cleaned by a gentle curettage and sometimes by removing the lining membrane and must be irrigated and drained properly. It also must be given good ventilation. In nearly all of these cases the sinus should be irrigated with warm salin through an opening under the inferior turbinate, and if the infection is of oral origin, the washings drain downward into the mouth. If the case is of oral origin and there is no opening into the mouth, of course the washings naturally return to the nose and are discharged through that cavity. I do not see why the mouth opening in the oral cases should be packed in any case more than a few days, even if the suppuration has not ceased and although the tissues

around the oral opening are not in sufficient healthy condition to bear sutures. In many cases it is advisable to close mechanically the oral opening for a time on account of the suppuration. In these cases the mouth and the maxillary sinus should be separated by a well fitting "saddle plate" that does not press at all on the edges of the wound leading into the antrum. No plug or projection that enters the opening should ever be used. I cannot condemn too severely the use of any appliance that tends to establish a permanent opening between these two cavities. This saddle plate is best made of rubber, and covers over the labial and palatal surfaces of the alveolar process, and is generally held by clasps. Of course this is a temporary affair, and is to be worn only until the suppuration has subsided and the plastic repair of the opening can be accomplished. This plate in a way acts as the valves of the heart, that is in one direction. It allows of drainage from the antrum downward with gravity under the plate into the mouth, but prevents the seepage upward of the oral secretions into the maxillary sinus. These plates, if constructed properly, never block the drainage, and keep the antrum cleaner than any gauze drain can possibly keep it.

In searching the literature, we find little mention of any operative procedure for closing off an opening from the mouth into the maxillary sinus. Little attention has been given to the fact that the mouth and the antrum are two very unlike cavities, that their secretions and their bacteria contents vary greatly, and that they are much better neighbors when they are separated by a barrier of healthy tissues. In cases in which the opening persists between the two cavities, the only permanent method of closing the communication is by means of a plastic operation. A method will be shown by slides later. Infections of the maxillary sinus are often not diagnosed by the dental surgeon and are frequently poorly treated by him. After all that has been written on this subject, it is pitiable to pick up a modern dental journal and to read in a recent number an article advocating the use of the rubber plug, and further to read that "the plug in the antral opening helps to hold the plate in place".

I believe that the rhinologist and the dental surgeon should work more closely together in the treatment of maxillary sinusitis. I feel that it would be better in most cases for the dentist when he discovers an infection of the maxillary sinus to turn the case over to the rhinologist unless he is especially equipped to handle these cases. I have seen many cases treated by my dental friends through the mouth when the infection was a descending affair from the

nose, ethmoid and frontal sinuses. In many of these cases they accomplished nothing for the seat of the infection was far removed from their field of activity. *On the other hand I do think that the rhinologist* should know in every case of antral infection the conditions of the teeth and the oral tissues. In many cases he fails to recognize the oral pathology until after the case has not responded to his treatment. In some cases after weeks of almost daily irrigations, etc.

Dental radiographs should be taken in all cases and the question of any non-vital teeth that may communicate with the antrum settled before a diagnosis is made. If a tooth looks suspicious in a dental film its vitality should be ascertained by the usual thermal test, ethyl chlorid spray, electric current or some other means. If the tooth is found to be non-vital, even though it has never been filled, it takes considerable courage on the part of the operator at times to convince the patient that it should be removed. In these cases I nearly always obtain the consent quite readily to make an exploratory incision over the roots of the tooth in question, telling the patient that I will not extract it unless it is found to be infected and that it is draining into the floor of the antrum. This generally appeals to the patient as being fair and in this manner I often save for them very valuable teeth that are innocent, even though the dental X-rays may lead one to think differently. Sometimes the radiograph does not show any infection at the root of a tooth for the reason that the tooth has recently become non-vital and there has not been time for a granuloma to form or any bony changes to take place that would show in the film. At other times the X-ray shows shadows cast by double septa on the antral floor. These teeth are nevertheless the cause and must be removed. My method in these cases after finding such a tooth to be infected is to remove it at once and then to irrigate the antrum through the exploratory incision. If the return flow shows pus I then immediately enlarge my incision, extending it anteriorly to the canine fossa and posteriorly to the last molar. I then lay back the entire labial fold of soft tissues and expose thoroughly the anterior of the antrum. By means of chisels, curettes and the rongeur a large opening is made into the antrum, through which a careful inspection of the antrum can be made. Incidentally the end of the tooth socket can be seen and carefully curetted. If there are polypoids present they are gently removed and also any necrotic lining membrane removed. Great care is taken to remove all diseased tissue without injuring unduly any of the healthy lining membrane. The cavity is then carefully wiped out two or three times with a piece

of gauze and then irrigated. The nose has been cocainized previously after the antrum was found to be infected and then a fair-sized opening is made under the inferior turbinate by means of a punch and a curette. A large piece of iodoform gauze is then inserted through this opening and is pulled into the antrum by a tenaculum inserted through the oral opening in the antrum. Pulling a fair-sized piece of gauze about one-half inch wide, doubled generally, into the antrum toward the oral opening already made draws the torn edges of the nasal mucous membrane into the antrum or at least invaginates it sufficiently to cover in most cases the rough edges of the nasal opening. This of course has two advantages. It covers the bony margins of the opening, thus causing almost primary healing over the edges of the bony wound in the lateral wall of the nose and this also prevents the opening from closing as the bony edges are now covered over by mucous membrane and granulation of this wound is prevented. Enough gauze is pulled into the antrum to fill the cavity comfortable but none of the gauze is allowed to enter the mouth wound. This generally prevents subsequent hemorrhage and I think stimulates granulations in the antrum. The oral opening is then closed carefully by a plastic operation of some kind, including the tooth socket. If the antral infection has been very severe a second piece of thin gauze may be inserted between the flaps to give better drainage. This piece is removed the next day. The nasal piece is allowed to remain for forty-eight hours and then is gradually removed by degrees, sometimes not entirely for four days. Then after all gauze has been removed the antrum is irrigated daily with warm normal salt solution and all sutures removed in about three to five days. This operation, I think, can best be performed under local anesthesia, nerve blocking and by swabbing thoroughly the inside of the antrum with cocain, about 5 to 10 per cent, care being taken of course not to use too much. The patient is also given morphin as a rule before operation. I do most of these operations in the office and if necessary have a nurse go home with the patient and remain with them the first night. Most of these cases clean up in about ten days to two weeks, even though they have been very chronic.

This operation has three distinct advantages, I believe: First, the oral pathology is removed; second, maxillary sinus pathology is obliterated; third, good nasal drainage is established.

The above three objectives are gained by one operation at one time and it eliminates separate operative procedures to correct the nasal and oral conditions.

33 East Sixty-eighth Street.

INTERMITTENT PROTRUSION OF THE RIGHT EYE.*

Dr. Saul J. Selkin, New York.

W. S., a young man age 23 years, with a negative family history, about November, 1924, began to be troubled with an intermittent protrusion of the right eye, simulating an exophthalmos, appearing now and then at frequent intervals and returning to its normal position during the course of the day. The vision in that eye was also affected. Examination of the eyes showed the vision of the right eye to be 20/100, while that of the unaffected eye was normal. In January, about six weeks after the beginning of the eye disturbance, an anterior and posterior operation on the right side was performed by a surgeon. Two or three days later the vision began to improve and in a short time was normal—20/20—but the intermitted exophthalmos continued, and in February the same surgeon performed a semiradical operation through the intranasal route on the antrum of the same side with the idea of relieving the exophthalmos, again without success.

When the patient came under my observation in March, 1925, he presented a marked exophthalmos of the right eye, with a slight puffiness and redness of the upper and lower eyelids. The left eye was normal. On subsequent examinations the right eye would be back in its socket, with very variation from the left eye. There was no tenderness in the frontal region, the Ewing sign being absent on both sides, and there was no history of headache. The mucous membrane of the nose was normal, excepting where the ethmoidectomy was performed.

Entrance into the antrum was easily accomplished with a probe. There was no discharge of purulent or mucopurulent secretion.

The patient was referred to Dr. Schoenberg, for an ophthalmological examination, who reported a moderate exophthalmos of the right eye with mild engorgement of the blood vessels and a very slight edema of the optic disc. Nothing else abnormal. He felt that the bulging of the right eye and the mild edema were not due to any nasal condition and was inclined to believe that there was some orbital process present—perhaps a periostitis with slight exudate or swelling of the orbital fat—whether this was secondary to some hypophyseal process he was unable to say.

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A thorough physical examination brought out the further facts that in addition to the history of swelling of the eye for six months there was also a history of increased urination during the same period, chronic constipation, and excessive cigarette smoking. Enlarged lymph glands were found in the left axilla, very active knee jerks, and an acromegaloid facial contour.

Fluoroscopic examination of the heart and lungs proved negative.

Laboratory findings: Basil metabolism 0.

The urine showed a heavy trace of albumin on two examinations, with many red blood cells; specific gravity, 1027; acid reactions; no sugar.

The blood count showed 6000 white blood cells; a smear revealed no abnormality. Two Wassermann tests were negative.

The blood urea is .065 per cent. This, according to the pathologist, may indicate considerable kidney damage. In association with albumin and red cells, it indicates a subacute nephritis. This, of course, does not rule out the possibility of a neoplasm at the base of the brain. He was put on calcium therapy and other medicament to improve his kidney condition, but with no apparent result as to his eye disturbance.

X-ray examination by Dr. H. A. Goalwin revealed the fact that some cells remained uneradicated at the lamina paparacia, and that there was some cloudiness of the maxillary antrum, with cloudiness of the orbit, haziness of the outline of the right lesser wing of the sphenoid, and depression of the right anterior clinoid process which, together with an apparent breach of continuity of the roof of the right orbit, leads to a suspicion of a right supraorbital tumor.

Details: The skull is rather large, normal in shape, with smooth inner surfaces and several areas of unusual thinness. The thinned areas are particularly striking in the frontal region immediately above the frontal sinuses and at the posterior angles of the two parietal bones. There is evidence of long-standing high intracranial pressure and overdevelopment of all the pneumatic spaces, a characteristic of pituitary disturbance. The sella turcica is moderately enlarged, but normal in shape and structure of its walls.

There is considerable cloudiness of the right maxillary sinus with thickening of its walls; the right ethmoid cells are also cloudy and their walls are thickened and atrophic; these two sinuses are apparently in free communication with each other.

The right lesser wing of the sphenoid is hazy in outline. The entire right orbital area is cloudy. The right anterior clinoid process is pneumatized and depressed below the level of the cor-

responding clinoid process on the left side. About 1.5 c.m. anterior to the apex of the right orbit there is apparently a breach of continuity of the roof.

The vertical diameter of the right optic canal is smaller than the corresponding diameter of the left optic canal. They are otherwise normal in shape, size and structure of their cells.

Calculated diameters of the optic canals: Right, 4.3 x 4.7 m.m.; left, 3.9 x 6.1 m.m.

A neurological examination was made by Dr. Louis S. Aronson, who reported no evidence of involvement of the brain or central nervous system. "The cranial nerves are all negative. There is evidently a local process behind this eye."

In view of the rather contradictory opinions rendered by some of the examiners, as offset by the detailed X-ray report, the plan of procedure which seems to offer most hope of relieving the condition seems to be to re-operate the ethmoid region and clean out as far as possible all the remaining cells around the orbital region, as revealed by the X-ray. This will be done as soon as practicable, and I hope to report a successful result at a later date.

114 East 61st Street.

A REPORT OF THREE CASES OF PRIMARY ACUTE MASTOIDITIS.* **

Dr. Samuel J. Kopetzky, Dr. Ralph Almour, New York City.

Case 1: A widow, age 65 years, was first observed by us on Feb. 16, 1924. At that time she had an acute tonsillar infection, which subsided under local treatment. She then complained of a stuffy feeling in her right ear. Otoscopic examination at the time showed both drums to be normal. This sensation in her ear lasted for one week and then stopped entirely. The patient was perfectly well for several weeks.

On Mar. 20, a slight swelling appeared behind the right ear. This was not tender and produced no discomfort beyond the sensation of a fullness of the tissues over the mastoid process. Urinalysis and blood chemistry at the time revealed normal findings. Wassermann

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reaction was negative. The blood count was within normal limits in both total and differential estimations.

The swelling behind the right ear became progressively larger without producing either systemic or local effects. The right drum was at all examinations normal as regards position, color and landmarks. Careful inquiry elicited no history of any aural disease prior to the present condition.

Functional examination of the hearing on Mar. 27 showed but a slight diminution for air conduction in the right ear. There was lateralization of sound to the right ear. There were no symptoms, either systemic or local, which would make one suspect the presence of a focus of suppuration in the temporal bone. The case was treated for one week by the applications of wet dressings externally.

On Mar. 27, there appeared a distinct area of fluctuation over the swelling. The patient was then sent to the hospital for observation. A radiograph taken at this time showed a clouding of the mastoid processes of equal intensity on both sides. No cellular structure was made out on either side.

On Mar. 29, the patient was operated upon. The findings were as follows: Over the right mastoid area there was a swelling, distinctly localized, which fluctuated on pressure. This mass pushed the auricle forward. On incising through the soft tissues, fluid pus escaped under pressure. This seemed to have burrowed forward toward the posterior meatal wall. On retracting the periosteum, a perforation of the cortex was found situated a little below and posterior to the suprameatal spine. The bone surrounding this perforation was very soft and from it a fistulous tract led directly inward toward the antrum. Another purulent tract was found leading to the dura and a third backward toward the sigmoid sinus. The bone and cells surrounding these tracts were cheesey and necrotic. There was very little bleeding from the entire mastoid wound. Scattered throughout the mastoid process were areas of normal cells and normal bone which, when removed, disclosed diseased cells. The dura toward which the fistulous tract led was uncovered for one-quarter inch in diameter and found studded with granulations. A paracentesis of the drum was then performed, but no pus was obtained. The middle ear was inspected through the external auditory canal and found to be normal. The wound was dressed and closed. The patient recovered.

Case 2: A man, age 58 years, began to complain of pain and diminished hearing in the left ear on Dec. 1, 1924. He had always had obstructed nasal respiration, and being advised that this was the

cause of his ear condition, was accordingly operated upon by a rhinologist for nasal polypi. Following this operation, performed Jan. 27, 1925, the pain in the left ear increased in intensity. At this time the drums appeared normal as regards position, color and landmarks. There was, otoscopically, no indication that the left ear had ever before been the site of a suppurative process, and on questioning the patient, no history of previous aural disease was obtained.

One week after the nasal operation a swelling appeared behind the left ear. This, at first not painful, gradually increased in size and became tender to the touch. Sleep was not disturbed to any extent, nor were there any systemic symptoms such as fever, loss of weight, malaise, pain or facial pallor.

The patient was first seen by us on Feb. 9, at which time there was a definite subperiosteal abscess over the left mastoid area, located more above the auricle than behind it. The patient was operated upon the following day, the preoperative diagnosis being acute primary mastoiditis.

On incising the skin, there was a gush of pus from the soft tissues. After retracting the periosteum, a perforation was found in the zygoma through which pus came away in pulsations. On entering the cortex, the perforation was found to communicate with a large perisinal abscess. The sinus was found exposed by the disease and covered with granulations to the extent of one-half inch. The entire mastoid process was exenterated and the sinus was exposed until normal looking wall appeared. The wound was packed and dressed. The patient recovered.

Case 3: Child, age 8 years, had been troubled with swollen glands of the neck during the winter of 1924-25. She had since the age of 2 years, been subjected to repeated attacks of acute nephritis. About Feb. 3, 1925, the child developed a rash over the entire face and neck, associated with septic temperature from 100 to 104° F. This condition was diagnosed as erisipelas by the patient's physician. The child apparently recovered from this attack in one week.

When seen by us on Feb. 21, 1925, there was a tender swelling of the tissue over the left mastoid process. There had never been any aural discharge at any time during the child's life, and the tympanic membrane was normal in color, position and landmarks. The child complained only of pain behind the ear and in the neck. The child was sent to the hospital, where blood counts, blood culture and radiographs were taken. The Roentgen films showed clouding of the left mastoid process and absorption of the bony

intercellular walls. The right mastoid process was normal. The blood count showed an increased polynuclear percentage and an increase in the total number of white cells. The blood culture was sterile and remained sterile for 72 hours.

The condition was diagnosed as primary mastoiditis and the child was accordingly submitted to operation. On incising through the soft tissues over the mastoid area, pus escaped from the lower angle of the wound coming from behind and below the mastoid tip. On retracting the periosteum, a large perforation was found at the lower angle of the old occipito-mastoid suture just a little above and behind the tip. A probe inserted through this revealed a large cavity in the mastoid process. Directly internal to the perforation, and connecting with it by a fistulous tract was an area of exposed sinus, 3/8 inch in diameter, which was covered with granulations and denoted the site of a large perisinal abscess. The entire mastoid process was next exenterated. The dura of the middle cranial fossa was exposed and found normal. The sinus was then exposed backward and found collapsed and white. There were no pulsations of the sinus, and as far as could be determined without opening the sinus, no blood was coming from above. In view of the good condition of the child, and in the absence of any signs of sepsis or absorption from a purulent focus, no further surgery on the sinus was undertaken. The child progressed favorably for the following six weeks, when it suddenly developed acute glomerular nephritis and died in uremic coma.

COMMENT.

The three cases present the following factors in common:

1. An absence of any aural disease prior to the present.
2. The finding of a normal membrana tympani at all stages of the disease.
3. The failure of the disease to produce even a moderate local or constitutional reaction.
4. The finding of a subperiosteal abscess and a perforated cortex.
5. An erosion of the inner table with an involvement of either the sinus or dura.

Cases such as these have been noted by Phillips, Perkins, Friesner and Beeger. They consider that the infection in passing from the pharynx into the mastoid process skips the middle ear, and by forming excessive granulations in the mastoid antrum, mechanically blocks the mastoid process and isolates it from the tympanic cavity.

51 West 73rd Street.

THE CLINICAL SIGNIFICANCE AND DIAGNOSTIC VALUE OF TUNING FORK TESTS FOR HEARING.*

Dr. Arthur B. Duel, New York City.

When first invited to speak on the clinical significance and diagnostic value of tuning fork tests for hearing, I was somewhat loath to accept the honor, on the ground that the subject was too elemental to prove entertaining to a body of specialists in otology. On second thought, however, I was tempted to undertake the task, partly because it involved only a logical consideration of what all recognize as the fundamentals of functional testing of hearing, and partly because I was stimulated to contrast the information gained from the employment of a comparatively simple set of tuning forks with that obtained from the most elaborate apparatus.

What do we really try to determine with tuning forks and the Galton whistle?

1. If the lower tone limit is *raised* above the normal (16 v.s. per second).

2. If the upper tone limit is *lowered* below the normal (30,000 to 20,000). This test is made with the Galton whistle.

3. If bone (tissue) conduction is better than air conduction, or vice versa, the so-called Rinné test.

4. If the tone from a vibrating fork with the shank pressed on the vertex, forehead, or chin, is referred to the poorer-hearing ear or to the better-hearing ear, the so-called Weber test.

5. If the tone of a 128 v.s. or 256 v.s. tuning fork, held in any of these positions, appears to be amplified by crowding the finger tightly into the external auditory meatus, the so-called Gellé test.

6. If the patient hears a vibrating fork for a longer or shorter period than the examiner: *a,* by bone conduction, the so-called Swabach test; *b,* by air conduction.

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Certain errors have to be guarded against, *e. g.,* in determining the limits by *air conduction:* the position in which the fork is held; the intensity of the vibration quite as much as the tone pitch; the production of overtones, etc. In determining the limits by *bone conduction:* the amount of pressure; the intensity as well as the pitch. It would be futile to contend that absolutely accurate tests can be made with forks. The results are more qualitative than quantitative.

However, quick and practical tests of bone conduction; comparative tests of the right and left ears, or comparative tests of the patient's and the examiner's ears; the Weber, Rinné, Gellé, Swabach tests—all of great value in gaining a concept of the condition of hearing—are made with the 128 and 256 tuning forks. For my own part, these tests are made more satisfactorily by this method than by the more elaborate apparatus.

After the upper and lower tone limits, and the comparative results from air and bone conduction have been determined, the examiner wishes to know at what distances and at what intensities whispers, spoken words, noises (acoumeter or watch), are heard before and after inflation. Comparisons of *tone limits* after inflation are interesting but, while they may not be said to be without value, are not really of much practical importance. What the *patient* really wants is to hear speech, familiar sounds, music, etc., and his estimate of improvement or decadence will be formed by these tests.

As to the clinical significance of these tests; what have we learned by these reactions?

We all know that any lesion obstructing the conducting apparatus in either the external or the middle ear, any interference with the patency of the Eustachian tube, any alteration of the density of the labyrinthine capsule, will cause an *impairment of hearing* varying with the amount of obstruction. The loss of hearing will be in the *lower register.* This will usually be accompanied by tinnitus of a comparatively *low pitch* and probably of a *pulsating character.*

We also know that *all* such *lesions* of the conducting apparatus, if uncomplicated, will cause a *raising* of the *lower tone limit, the upper tone limit remaining normal;* the *bone conduction* will be *better* than the *air conduction;* the tuning fork in vibration placed on the vertex, forehead, or point of the chin, will be referred to the poorer-hearing ear; the Swabach test will be positive. The pitch to which the lower tone is raised will correspond with the

amount of obstruction or interference with the conducting mechanism from whatever cause.

We, therefore, have in tuning forks and the Galton whistle a measure which is most valuable for both the diagnosis and the prognosis of all the so-called catarrhal forms of deafness, the sequelae of suppurative lesions, and otosclerosis.

We are also well aware that lesions of the *receiving* apparatus, uncomplicated with lesions of the conducting apparatus, cause an impairment of hearing depending on the amount of degeneration of the nerve. The loss of hearing will be in the upper register. This will usually be accompanied by a tinnitus of *high pitch* and continuous character. Such lesions will be characterized by a lowering of the upper tone limit, the lower tone limit remaining normal; air conduction will be better than bone conduction; the tuning fork in vibration placed on the vertex, forehead, or point of chin will be referred to the better-hearing ear; the Swabach test will be *negative.*

So we have in uncomplicated lesions of the *conducting apparatus* an absolute reversal of the tuning fork tests which we find in uncomplicated lesions of the *receiving apparatus.*

We also know that obstruction of the *conducting apparatus* does not lower the upper tone limit unless there is a fixation of the stapes in the oval window. With a fixation of the stapes in the oval window, there will be a marked interference with the *upper tones* as well as with the *lower tones.*

In a given case, then, where there is marked interference with both upper and lower tone levels, it is quite obvious that *only* by a carefully interpreted comparison of bone and air conduction, as furnished by the Weber, Rinné, Gellé and Swabach tests can we arrive at a differential diagnosis, let us say, of an otosclerosis with fixation of the stapes, and an otosclerosis with a concomitant degeneration of the eighth nerve. In each the hearing distance for both whisper and acoumeter might be the same. In the first case, Weber would be to the poorer-hearing ear. Rinné would be negative; Gellé would be negative; Swabach would be positive. In the second case, each of these tests would be reversed: Weber would be to the better-hearing ear; Rinné would be positive; Gellé would be positive; Swabach would be negative. I know of no way, other than by tuning forks, or making such an accurate differentiation.

And there you are! "It's as clear as mud." It's much like the little boy's conundrum in which he asked: "'What is it that has

two legs, is all over feathers, lays an egg every day, and *barks like a dog?*" His enthusiastic audience, anxious to guess that it was their staunch friend who furnished the piece de resistance of their daily breakfast, were pondering over the last dubious factor in the problem, when he triumphantly announced that *it was a hen!* "Oh," said they, "but how do you get the 'barks like a dog'?" "Well," said he, "it seemed so easy that I just put that in to make it difficult." And so, amongst our easy problems, "just to make it difficult", we may "throw in" a case of otosclerosis with Eustachian stenosis from catarrhal processes, on the one hand; and an otosclerosis with a concomitant eighth nerve degeneration, on the other; then a case of a child with obvious tonsils and adenoids, apparently causing a catarrhal deafness, but whose profound loss of hearing actually has resulted from an attack of mumps; and, lastly, an eighth nerve neuritis from toxic poisoning, which will raise enough havoc with the functional test to upset the easy interpretation of all our fundamentals. So, any of these, and many others which I might recount *ad nauseam* if not *ad infinitum*, might make us think our staid old hen "was barking like a dog".

Nevertheless, our tuning forks and the interpretation of the results of these fundamental tests which I have outlined would be our mainstay in helping us to form our conclusions. And this is about all. In the main, this discourse has been so elemental that I cannot do better, in closing, than to quote a familiar passage from "Mother Goose":

> "Three men went out to sea in a bowl.
> If the bowl had been stronger,
> My tale had been longer."

4 East Sixty-fifth Street.

BRAIN ABSCESS, SINUS THROMBOSIS AND MENINGITIS COMPLICATING ACUTE MASTOIDITIS; A CLINICAL STUDY OF TWO CASES.

Dr. J. M. Polisar, Brooklyn.

Chairman and Gentlemen: The following case which I am presenting is one of sinus thrombosis and temporosphenoidal lobe abscess following acute mastoiditis.

Case 1: Hitsory: D. B., female, age 10 years, admitted to the Brownsville and East New York Hospital Jan. 23, 1925, complaining of pain in the left ear and mastoid region accompanied by fever. The story was that following a cold in the head, six months ago, she developed pain in the left ear, followed in two days by a spontaneous discharge, which continued for six months. In the past two weeks the discharge became more profuse and the patient developed pain and a temperature ranging from 101-103.° Two days before admission the temperature rose to 104-105,° preceded by chills. A painful swelling was noted over the mastoid. The discharge became scanty, thick and fetid. The R.B.C. was 4,000,000 with an Hb. of 70 per cent. W.B.C. 13,400 with 79 per cent polys. X-ray of the mastoid showed coalescence, especially at the knee of the sinus, with slight haziness of the sinus outline on the affected side. Ear smear showed presence of staphylococcus aureus.

Patient was operated on the day of admission. A coalescent mastoid was found with the wall of the sinus exposed for about a half-inch and partially collapsed. The tegmen was intact. Aspiration of the sinus revealed neither blood nor pus. On incision of sinus free bleeding was obtained from above and below only after a well organized clot was dislodged and removed. Because of the gravity of the patient's condition jugular ligation was not attempted. The blood culture taken the following morning was sterile. For the first two days the patient ran a moderate temperature and the general condition was good. On the third and fourth day there were several chills followed by a septic remittent temperature ranging from 99-106.° The blood culture at this time showed a stroptococcus hemolyticus.

A jugular ligation was then performed, five days after the mastoid operation. The blood culture after the operation was still

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positive. For the next two days the temperature was very high (up to 106°), then declined to 99° and stayed down for the following four days. After this interval the temperature suddenly rose to 105° and remained at this level for the next four days. The patient's condition at this time was quite serious. She was drowsy and irrational at times, picking constantly at her nose. The only neurological findings were a slight Babinski and an ankle clonus on the right side, and a slight blurring of the optic disc on the left side with sluggish pupillary reaction to light. There was no rigidity of the neck, but the spinal fluid came out under increased pressure, was clear and contained 14 cells per m.m., principally polys. The culture of the spinal fluid was negative. The blood culture at this time and for the following seventeen days (up to time of exitus) was persistently negative.

At the suggestion of Dr. Kopetzky a blood transfusion was performed and 250 c.c. of blood by a matched donor was given. On the next day the patient was extremely restless and irrational, the left eye was closed, the upper lid was edematous and tender, the pupils were dilated, and there were focal signs of a left-sided intracranial lesion, namely, total aphasia, right hemiparesis beginning with the face and later affecting the upper and lower extremities, and an ankle clonus and Babinski, as well as a slight hypoesthesia on the right side.

On Feb. 7, nine days after the jugular ligation, an operation for brain abscess was performed. On removing the tegmen, the dura was intact and presented no pathological changes. A needle was introduced into the brain substance in the region of the temporal lobe for a distance of 3 c.m., and 2 c.c. of thin milky pus was aspirated. The abscess was incised and drained, and patient left the operating table in fairly good condition. For the next five days the temperature stayed down at 99-101° and the patient's general condition was much improved. Because of better co-operation on the part of the paient, the aphasia was more carefully analyzed and was found to be of the sensory type, namely, a word deafness. This, of course, definitely localizes the lesion in the temporal lobe because of the involvement of the Wernicke centre.

On the sixth day post-operative, there occurred a slight chill with a rise in temperature up to 104,° spinal puncture now disclosed an increased cerebrospinal pressure and a drop in the cellular count down to 4 cells per m.m., otherwise remaining the same as before. In twenty-four hours the temperature dropped to 99-100.5° and stayed down for four days, during which time patient's

condition was generally improved. On the eleventh day after the third operation the patient became stuporous, the face was flushed, temperature rose to 103,° the pulse was rapid and small. At 5 p. m. patient developed a tonic convulsive seizure with a turning up of the eyeballs. These repeated themselves frequently and the temperature soon rose to 108.4.° The lumbar puncture showed a slightly turbid fluid, with 57 polys., but the pressure had fallen, spinal fluid culture remaining sterile.

At 9 p. m. of the same day I had the pleasure of assisting Dr. Kopetzky at a decompression and exploratory operation. Only a few drops of pus exuding from the old brain abscess was found. However, the presence of other remaining abscesses is nevertheless not to be excluded.

The patient died at 3 o'clock the next morning.

Unfortunately an autopsy could not be obtained in this case.

Summary: I was prompted to report this case because of the relative rarity of the association of brain abscess and sinus thrombosis, also since there were no perceptible signs of communication between the mastoid cavity and the brain, we presume that the abscess or abscesses must have been metastatic in origin, and, lastly, because of the richness of symptomatology in this case, which makes it sufficiently interesting from a diagnostic standpoint.

The case just presented was that of a left-sided temporosphenoidal lobe abscess. The one to be reported next is a right-sided abscess in the corresponding brain area.

Case 2: A girl, age 9 years, came under observation because of pain in the right ear, swelling over the mastoid, headache and fever. She had had a spontaneous discharge from the affected ear for the past few weeks. While at this time no further details were elicited regarding the previous history, a later report disclosed the fact that headache had been present for months before. Examination showed a thick purulent discharge from the affected ear, sagging of the superior posterior wall and a marked tender swelling over the mastoid. Temperature was 104°, pulse 140, and respiration 26. The smear from the right ear showed a staphylococcus aureus. The W.B.C. was 9,400, with 82 per cent polys, and the R.B.C. was 4,600,000 with Hb. of 90 per cent.

The child was taken to the hospital the same day, namely, Feb. 28, 1925, and a mastoid operation was performed. It was rather striking that within four hours, *i. e.*, from the time I first saw her up to the operation, the swelling over the mastoid had notably decreased in size. At the operation a perforation of the cortex was

found just below the posterior root of the zygoma. After removing the cortex, we found a very small amount of pus, if any, but there was complete cellular destruction and necrosis at the tip, antrum and especially at the zygoma. The sinus plate was extremely superficial and was accidentally uncovered. There was no perceptible exposure of the dura of the middle fossa. The child made an uneventful recovery and at the end of the week left the hospital apparently cured, having only a slight discharge from the right ear and an almost closed healthy granulating wound.

Ten days after the operation the child developed a temperature of 104,° preceded by chilly sensation. The next day the child complained of pains over the right eye and right temporal region. On the day following, the pain still persisted. In addition she became very sensitive to light and noises, the temperature, however, dropped to 101.° During the two succeeding days the patient was more comfortable, though the pain over the right eye still persisted. The operative wound was practically healed and the ear was dry.

On the fifteenth day after operation, or on the fifth day of this post-operative complication, the general condition became markedly aggravated—the child getting more irritable, headache worse, vomiting fluids, but not projectile in character. The neurologic examination at this time showed a Babinski, ankle clonus and a slight Kernig on the left side, in other respects negative.

In view of the gravity of the situation, Dr. Kopetzky was consulted. He found the child sitting up in bed and more or less comfortable. There was an ankle clonus and a slight Kernig on the left side. The pupils reacted somewhat sluggishly to light. The head and neck were freely movable and there was no tenderness at any part of the skull. He advised hospitalization, with the object of taking a spinal puncture, examination of eye grounds and further study of the case. The parents as well as the patient were hesitating as to the necessity of hospitalization; but, the following morning when the patient reached the hospital, it had definitely lost ground. The patient lay in a semi-comatose condition and did not respond to questions. There was marked cervical rigidity with beginning opposthathamus. Twitching of the mouth and hands were noted, as well as a slight left facial paralysis. The right pupil was larger than the left and reacted very sluggishly to light. There was also ptosis of the right lid. Both eyeballs were in a stage of moderate diversion, the right disc was moderately blurred, hyperemic and elevated about three diaptus around the surround-

ing fundus. The left eye ground showed moderate hyperemia of the disc with a turgescence of the blood vessels.

The R.B.C. was 4,150,000 with a Hb. of 80 per cent. The W. B.C. 22,000 with 90 per cent polys. The spinal fluid came out under great pressure, turbid and on examination showed to contain 5 rings of albumin, 8,400 cells per m.m., mostly polys. The smear from the spinal fluid showed gram positive diplococcus.

At this time the patient was in a moribund condition and the cysterna magna was drained in a comparatively short time. Further exploration, however, would have meant the death of the patient on the operating table.

The patient died at 3 o'clock the next morning.

Post-mortem of brain as performed by Dr. Gross showed "the dura to be injected, the right temporal lobe immediately adjacent to the tegmen tympani was necrotic and purulent. At the junction of the tegmen with the squama the bone shows a necrotic opening, the size of a pea, communicating with the dura. The brain showed intense congestion of the cortical veins. There is a diffuse opalescent and at times suppurative exudate lying under the pia and the sulci. This is most marked over the left frontal area and not at all seen at the base.

Upon sectioning the brain in the usual way, the ventricles were found clear. The basal ganglia on the right side bulged somewhat into the lateral ventricle. The white matter as a whole showed intense vascular congestion. In the right temporal lobe, limited by the cortex externally, the external capsule internally, and extending from the anterior surface of the temporal lobe to as far back as the occipital lobe, there is a large abscess containing approximately two ounces of pus. The abscess cavity is lined by a thick pyogenic membrane.

Microscopically the section of the wall of the abscess cavity showed necrosis of brain tissue, suppurative inflammation, intense perivascular infiltration with numerous hyalin thrombosed vessels. Areas of neuranophagia and hemorrhages are scattered throughout.

Summary: In going over the case one will remember that the swelling over the mastoid had subsided before the operation, that no free pus was found in the mastoid cavity, that at post-mortem an abscess which has destroyed almost half of the temporal lobe and lined with a thick pyogenic membrane was found, a condition usually not found in brain abscesses of very recent origin.

We assume then that the brain abscess must have been there for months before, that a direct communication between the mastoid cavity and the dura must have existed prior to the operation, that before operation the pus from the mastoid escaped into the brain substance, thus explaining the reduction of the swelling over the mastoid before operation. The bony defect in the tegmen being very small at the time of operation must have escaped my observation, that while the wound was open the brain abscess was draining through the wound, but as soon as the wound closed, further destruction of brain tissue went on with the results as presented.

Of paramount importance is the fact that thirty-six hours before exitus, with so much destruction of brain tissue present, the patient did not look acutely ill.

With your permission, Mr. Chairman, I'll ask Dr. Gross to kindly demonstrate the pathology of the brain which I have just presented.

391 Pennsylvania Avenue.

TEMPOROSPHENOIDAL ABSCESS AND MASTOIDITIS OF DOUBTFUL ORIGIN.*

DR. WM. SIEGMEISTER, Brooklyn, N. Y.

Mrs. B. K., age 31 years, has been admitted to the writer's service at the United Israel Zion Hospital, Sept. 9, 1924, at 6:30 p. m.

Family history: Negative.

Past history: Had lump removed from breast eight years ago, married seven years, one child living and no other pregnancies.

Present history: Eight weeks ago had carbuncle on right side near lumbar region. Has been operated on and condition cleared up in four weeks. One week after the operation the patient complained of severe earache and toothache and could not open mouth. This condition continued for three weeks.

X-ray of teeth revealed two apical abscesses in two middle upper incisors. Three bridges and four teeth were removed. Pain in the ear persisted and she developed severe headache over right parietal region. Her temperature at that time ranged from 99 to

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100° and patient began to vomit. At first, typhoid was suspected, widal was negative. The case was diagnosed as influenza of gastro-intestinal type. Condition continued the same up to six days before admission, when the right ear began to discharge pus. An ear specialist was called in and diagnosed the case as O.M.P.A. and did a paracentesis. She has not had any medical care up to admission. Two nights before admission, patient had involuntary motions of her arms, and gripped her head tightly. In the morning patient became drowsy and complained of severe headache. Her physician had her admitted to the hospital.

Status presens: Patient well nourished. In semi-conscious condition, answering questions slowly, with hesitation. Temperature 99,° pulse 70.

Neurological examination by Dr. S. Rottenberg. Patient in semi-stuporous condition, but can be awakened. Responds to questions but soon falls asleep again. Points to head over right orbit, where there is a decided swelling extending over zygoma. There was slight ptosis of left lid and a decided weakness of left facial muscles. Tongue deviates to left. Palsy of left external rectus muscle. Weakness of left arms and leg. Abscence of abdominal reflex, left. Presence of Babinski and Oppenheim. Knee jerk is slightly exaggerated left side, ankle clonus absent. No meningeal symptoms.

Diagnosis: Evident lesion of right side of cerebrum. Most likely involving temporosphenoidal lobe.

Ear examination showed profuse purulent discharge from right ear, anterior inferior perforation of drum membrane. Same was bulging. There was a distinct drooping of superior canal wall. Swelling over zygoma in region of temporal muscle, which is markedly tender. Right mastoid tender.

Diagnosis: Acute mastoiditis with either extradural or temporosphenoidal abscess. Advised mastoidectomy with exploration of temporosphenoidal lobe.

Eye examination by Dr. Kruskal. Both discs swollen, outline blurred. Veins full, distended and tortuous. Many large hemorrhages on right disc and adjoining retina. A few small hemorrhages on left fundus.

Diagnosis: Bilateral optic neuritis (more marked on right side).

Blood examination: R.B.C. 4,900,000, Hb. 90 per cent, W.B.C. 19,000, plys. 87 per cent.

Lumbar puncture 30 c.c., clear, pressure increased. Globulin normal, sugar reduced, cells c.cm. 22 polys., 9 monos. 13.

X-ray, right mastoid, hazy and ill defined, showing an infiltrated triangle in region of antrum. In the region of squamous portion of temporal bone, slightly above and in front of external auditory meatus there is a circular lobulated shadow of decreased density about half an inch in diameter.

Patient was operated on by the writer at 9:30 p. m.

Operative findings: Cortex congested.

Mastoid diploic in type, filled with granulations. Few tip cells filled with pus.

Antrum filled with pus and granulations.

Tegmen antri ruptured.

There was a sinus leading anteriorly filled with pus. Incision extended anteriorly for about one-and-a-half inches, cutting temporal muscle, a large accumulation of pus under muscle found. There was a rupture in squamous portion of temporal bone, communicating with a large epidural abscess. Dura was covered with granulations. There was no rupture of same or sinus leading into cerebrum found. Bone removed for one-and-a-half inches, until normal dura was found on all sides. Having found such a large epidural abscess, patient not being in good condition the writer did not deem it advisable to explore the cerebrum and decided to wait developments till next morning, if there be no amelioration of symptoms, to explore the temporosphenoidal lobe. At 1 a. m. patient's condition fair, pulse 104. Respiration 30. At 4 a. m. patient's temperature rose to 107,° pulse 144. Cynotic, oxygen was given. Patient did not rally and died at 8 a. m.

On entering with a needle through the wound in the temporosphenoidal lobe, post-mortem, there was found an abscess which contained 6 c.c. of thin greenish pus.

This case is most atypical. Temporosphenoid lobe abscesses on the right side are usually diagnosed very late. Their course is usually very long, especially the latent stage. They are amenable to surgery, even those that succumb after operation linger for some time, the patient dying either from an encephalitis developing afterwards, sepsis from poor drainage, or when it is multiple, from the rupture of an abscess which has been overlooked by the operator. The etiology after operation is usually very easily established.

This case has fully developed within five weeks. There has been no period of latency, the period of excitation merging with the terminal period. It has been diagnosed when first seen, patient dying ten hours after operation. The etiology, post-operative, cannot be established with certainty.

On analyzing this case several questions come to one's mind. We had here, four abscesses communicating with one another through narrow channels: "mastoid, subtemporal, extradural, temporosphenoidal". Where did the first originate? Did it originate in the mastoid, breaking through the cortex of the squamous portion of the temporal bone, forming also a subtemporal abscess and traveling through the dura, forming the temporosphenoidal abscess? Or was the abscess entirely metastatic, forming originally into the temporosphenoidal lobe from an embolus from the original carbuncle in the thigh, traveling afterwards through the dura, forming the extradural abscess, through the tegmen into the mastoid and through the squama, forming the subtemporal abscess?

At first thought one would consider the former possibility, as most temporosphenoidal lobe abscesses are considered of otitic origin, especially when there was a mastoiditis present.

Secondly, it is rather unusual to have metastoisis from a superficial carbuncle into the temporosphenoidal lobe, without involving the lung, kidneys or any other viscera. Yet, analyzing the case as a whole, we must rather favor the second hypothesis. The principal complaint of the patient was headaches and vomiting, four weeks prior to the operation. She did complain of earache, yet the drum membrane has ruptured only six days before admission. We cannot conceive that a mastoiditis giving such severe symptoms, fever, headaches for four weeks, breaking through the tegment and the tough dura, shall not break through the drum membrane. Temporosphenoidal lobe abscesses occur very rarely in acute mastoiditis.

If it does occur, I have not seen a case reported to develop fully in one week. Secondly, the micro-organisms found on examining discharge from ear, from mastoid wound, from extradural and temporosphenoidal lobe abscess, was found to be pure staphylococcus, which is rather unusual for acute mastoiditis: it is more usual for a carbuncle. From the above the writer rather inclined to believe that the abscess was metastatic in origin, breaking its way outwards.

4915 Fourteenth Avenue.

SOME CLINICAL REMARKS ON MODIFIED RADICAL MASTOIDECTOMY FOR CHRONIC PURULENT OTITIS MEDIA AS PRACTICED BY THE AUTHOR, WITH LANTERN SLIDE DEMONSTRATION AND PRESENTATION OF PATIENTS SHOWING RESULTS.*

Dr. Hugh B. Blackwell, New York City.

Despite the great advances made in otology in recent years and the general dissemination of knowledge concerning surgical technique of the mastoid among the profession and the improvement in hospital facilities for treating and operating upon diseases of the ear throughout the United States, the mortality statistics taken from the Census Bureau from 1911 to 1921, inclusive, show not only a relative but an actual increase in the number of deaths attributed to ear disease. Roughly speaking the figures for 1921, which is the last year available, are almost double those of 1911 and are based upon the reports of thirty-five states. The leading insurance companies are about divided upon the subject of issuing policies to individuals afflicted with chronic otorrhea, a number of them refuse to insure such an applicant on any basis and those who do would only issue a policy at an advance in age of from 30 to 50 per cent. For example, a man, say age 35 years, who has a non-odorous aural discharge of a chronic nature, would have to assume the rate given to a normal man of 42 years; on the other hand, should the discharge be of a foul nature he would have to accept the rate allowed a normal applicant of 47 or 48 years.

Unless we are mistaken it has seemed to us that in recent years there has been a growing indifference on the part of otologists generally to the potential gravity of chronic otorrhea, that is as compared with the attitude of the profession in previous years.

A reference to the above facts is therefore interesting and timely. We also believe that during this period of the past fifteen years there has been a growing reluctance on the part of otologists in recommending the radical operation as the only source of relief in chronic ottorhea, at the same time more marked dependence

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being placed upon intensive treatment of different kinds for this condition; this attitude on the part of the profession might be ascribed to the following reasons: first, the loss of hearing which usually follows the performance of a radical operation; second, the incidence of facial paralysis, which, by the way, more frequently occurs as the result of intratympanic instrumentation; and third, that despite all attempts the aural discharge frequently persists after the operation. Conversely, in a patient presenting a similar clinical aural picture, the feeling on the part of the otologist that

Fig. 1. The primary incision. Its upper extremity is directed horizontally forward.

in the absence of urgent symptoms he is quite justified in treating this patient more or less indefinitely and that as long as the patient can be under observation and observed from time to time and that with the aid of spinal fluid examinations when necessary, X-rays, close attention to clinical manifestations, the patient's position will be reasonably safe, the physician believing that it will be always possible to foretell the development of a dangerous complication by making an early diagnosis and performing the operation before its onset.

In view of the statistics quoted I would like to ask are we justified in maintaining this attitude of non-operative interference in the absence of urgent symptoms in chronic otorrhea and to just what extent can we depend upon our diagnostic aids in forestalling the development of dangerous intracranial complications?

In this connection we must remember the great difficulty we have in keeping such patients under observation and maintaining the necessary clinical contact with them, as of course they are practically all ambulatory cases and their long years of association with this condition has caused the patient to either ignore it or treat it lightly, a great many cases not realizing that a discharge is present.

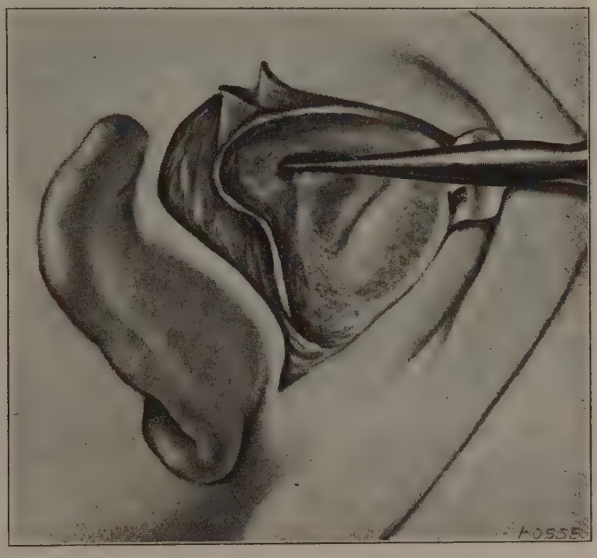

Fig. 2. Curette in position about to remove the external attic wall. The horizontal semicircular canal is visible just below and parallel to the narrow extremity of instrument shank.

Such individuals only think of consulting an aurist when the discharge becomes offensive or earache ensues. Furthermore, the suddenness with which intracranial conditions develop is frequently most disconcerting; one fact is at least certain, that when the characteristic facies of meningitis develops or germs appear in the spinal fluid the patient's doom is sealed; and these manifestations may occur early in the course of the complication. Granted that this is true, what then should be the proper attitude of the otologist in deciding the proper course to pursue in a given case of chronic otorrhea?

Severally speaking, we believe that in the absence of urgent or suggestive symptoms we should apply correct methods of treatment until it is quite evident that it is impossible to affect cure in this manner, the nose and throat should receive proper attention during this period. If after two or three months treatment and the discharge still continues, particularly if the odor still persists, there being no other contradictory reasons, such as age (advanced) or poor general condition, etc., we would advise an operation upon the mastoid. What kind of an operation would we advise? Before entering this question, I would like to discuss some features of the pathology of chronic mastoiditis.

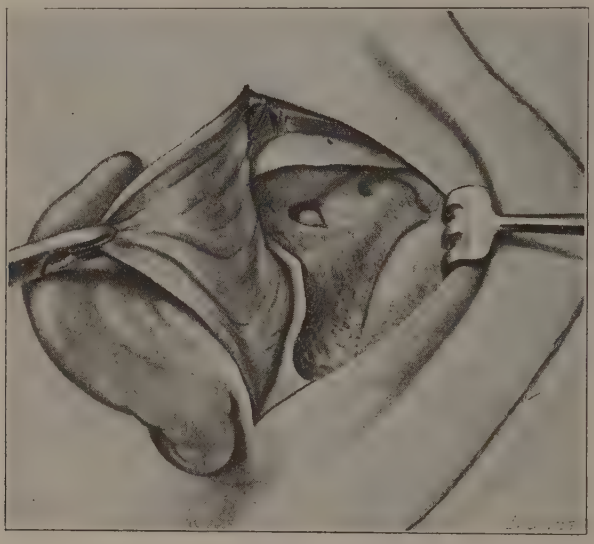

Fig. 3. The external attic wall partially removed, revealing the body and short process of the incus lying in the "fossa incudis" just below and anterior to the prominence cap of the horizontal hemicircular canal.

To those otologists who have performed a sufficient number of radical operations the faulty practice of defining as otitis media purulenta chronica cases of chronic otorrhea which have resisted treatment is quite apparent. The condition should be termed chronic mastoiditis, and deserves to be considered as such and not as the name implies merely a chronic purulent discharge in the middle ear. I feel sure that if the average individual who has a chronic otorrhea knew that he was suffering with chronic mastoiditis many more of them would be willing to submit to an operation upon the mastoid for its relief. The site of the trouble and source of the

discharge lies not in the middle ear but in the mastoid itself, as we well know there forms in these cases a cavity of varying size in the region of the antrum, which becomes filled with granulations, cholesteatoma, pus, detritis, dead bone, etc. During the course of the disease the overlying bone and surrounding walls of this cavity become rarified and condensed, the accumulated products of inflammation forming a nidus of infection which constantly reinfects the middle ear, causing a continuance of the discharge. Pus here may form under pressure, which may be so gradually applied as to give little evidence of pain and erosion may suddenly

Fig. 4. The external attic wall has been removed, the head of the malleus with its superior ligament can be seen anterior and internal to the incus. The internal and external attic spaces lie respectively on the inner and outer sides of the malleo-incudal body.

take place in the contiguous dura of the middle fossa, knee of the sinus or cap of the horizontal semicircular canal. It is in these localities specified which are most often found to be first affected and resulting in intracranial complication during the course of chronic otorrhea, caused no doubt by their proximate relation to this cesspool of infection always found in the antrum region in chronic mastoiditis. The size of the space depends upon the relations of these important structures to each other, *e. g.*, overlying dura, knee of the sinus and floor of the antrum, which is formed in part by the cap of the external semicircular canal.

It is evident, therefore, that the only way to surgically insure a patient suffering from chronic mastoiditis from serious intracranial complications is to thoroughly aerate, drain and expose the antrum region as otherwise this infected focus will remain or reassert itself. Nature sometimes has a way of automatically curing chronic mastoiditis by causing a necrosis of the posterior bony canal wall down to and including the epitympanic ring, which when sufficient bone sloughs away permits permanent drainage from the

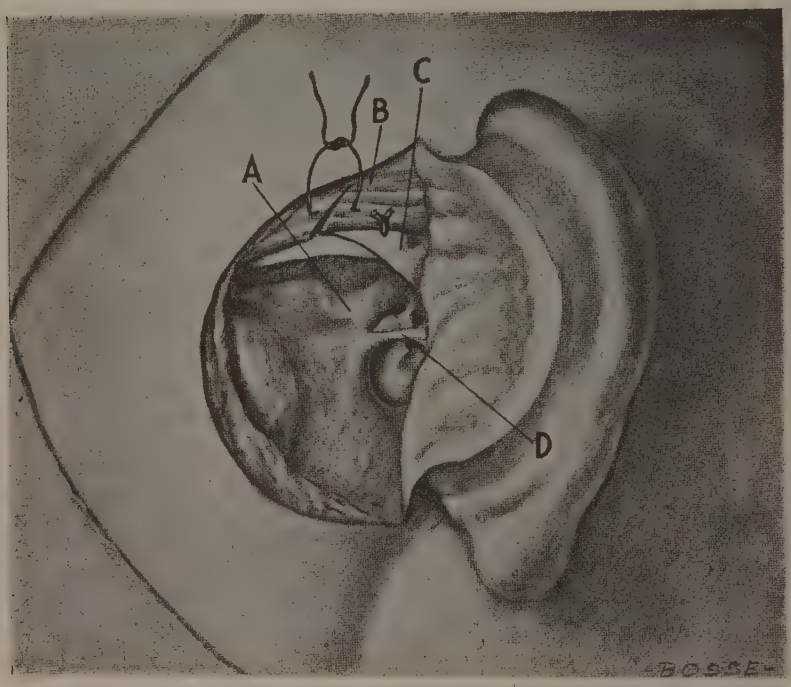

Fig. 5. Opposite mastoid. Operation more advanced, posterior bony canal wall has been lowered, leaving epitympanic ring, drum and ossicles intact. A—External semicircular canal. B—Temporal muscle. C—plastic meatal flap sutured to fascia of temporal muscle. D—Epitympanic ring of bone showing the alleo-incudal body lying just above and internal to the ring and the drum below.

interior of the mastoid and often approximates the result obtained by the operation about to be described. It might be said with a certain amount of truth that this operation is an extended effort on the part of Nature to cure the condition.

Realizing, therefore, that the labyrinth is most frequently found to be eroded at the cap of the horizontal semicircular canal, that the bone covering the sinus at the knee or its proximate relation

to the antrum most frequently diseased, also that the adjacent dura overlying the antrum to be that which is most frequently exposed and diseased by mastoid inflammation, it is evident that any operation having for its relief the cure of the patient and his subsequent safety against the development of serious intracranial complications must permanently drain, aerate and expose the antrum region. The futility of curing chronic mastoiditis by curetting the Eustachian tube is quite apparent. The radical operation satisfies the neces-

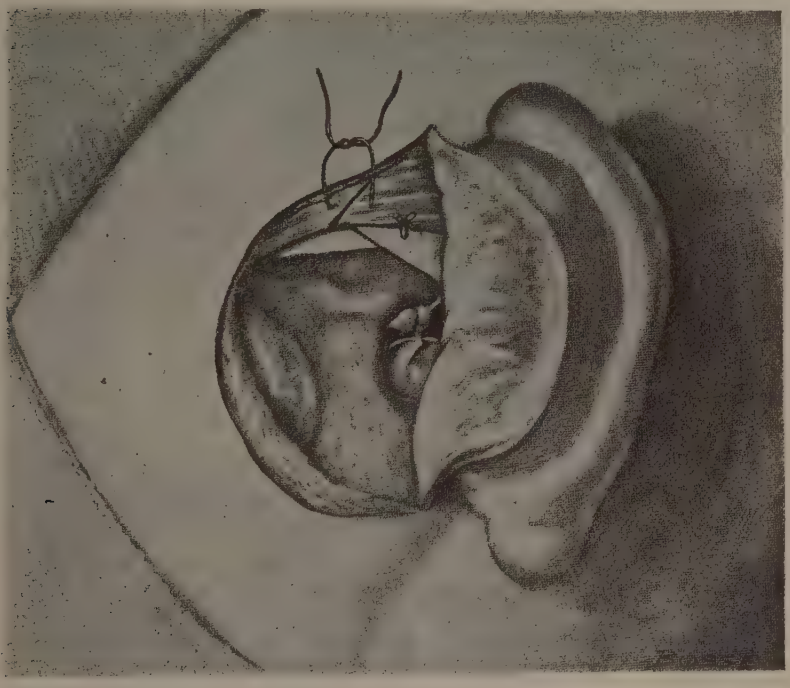

Fig. 6. View of operation completed, the epitympanic ring has been removed in the superior portion, the drum and ossicles have not been disturbed and are allowed to remain in situ. Posterior wound is now sutured. Cavity is subsequently dressed per new meatal canal.

sary postulates as stated, but of course has the concomitant drawbacks of subsequent loss of hearing; danger of facial palsy and sometimes continuance of the discharge. It is our belief that the practice of curetting the Eustachian tube during a radical operation frequently instead of obliterating that structure leads to a continuance of the discharge by reason of the mucous membrane persistently growing from the enlarged tympanic orifice, very much as it will sometimes grow from the mastoid antrum after a simple

mastoidectomy has been performed and the antrum thoroughly widened and exposed; subsequently should the antrum be tightly packed there would probably result a more or less permanent postaural sinus and depressed scar. When once the antrum region has been permanently aerated and drained the middle ear returns to normal in so far as it is possible for it to do so without any curetting of the tube whatsoever. Marginal perforations involving a great deal of the surface of the drum will frequently heal. There seems to be a primitive natural effort on the part of the tympanic membrane to reconstruct itself when once the cause of this destruction has been removed, which is analogous to the restoration of synovial membrane in cases of joint excision. This tendency is strikingly observed following a radical operation where every vestige of drum has been removed; after the wound is healed tissue closely resembling tympanic membrane will frequently be found stretching across the bottom of the radical cavity.

Some fourteen years ago, realizing the deficiencies of the radical operation as an operative cure-all for chronic mastoiditis, the author performed his first modified radical operation for the purpose of conserving and improving the hearing, causing a cessation of the discharge and, if possible, insuring the patient against future development of serious intracranial complications.

Operative indications: This operation seems to be especially indicated in cases of O.M.P.C. with a history of discharge ranging from several months to several years. Usually with a discharge of about five years or more such extensive necrotic changes have taken place in the middle ear, with resultant loss of hearing as to render the modified radical operation useless, although this is not always the case. From a functional standpoint, however, the operation is indicated in any case of chronic mastoiditis with very good hearing, which continues to discharge despite conscientious and persistent treatment as it is reasonable to suppose that a continuation of the discharge will cause a dimunition of hearing in the affected ear. Cases which present a wide antrum are more favorable subjects for the operation. It should be the operation of choice in cases of exostosis of the canal associated with O.M.P.C., and in perforation of the pre-mastoid lamina with necrosis of the posterior bony canal wall.

Operation: The usual postaural incision is made as in the Stacke operation. The soft parts anterior to this incision are elevated and retracted forward: the cortex is removed with a gouge and the subcortical cells with curettes until the antrum is opened; the pos-

terior canal wall is lowered and the antrum widened to its fullest possible extent. When the short process of the incus becomes visible, the external attic wall is removed by placing the back of the curette external to and in front of the incus and curetting from within outward. The bony canal wall is still further lowered until the facial ridge is reached, leaving only the epitympanic ring in its superior portion with a width of about a sixteenth-of-an-inch arching above the top of the drum from the posterior to the anterior canal wall. In our early cases we allowed this ring to remain, but in recent years we have removed it in nearly all instances, carefully separating it from the edge of the drum. By so doing we secure better drainage and more subsequent aeration and space in the antrum region and it is not associated apparently with any loss of hearing. The granulations, polypi and cholesteatoma lying in the external and internal attic are removed by curetting internal and external to the malleo-incudal body, care being observed not to destroy the suspensory ligament of the malleus. In curetting near the incus, great care must be taken not to disturb the ligament which binds the extremity of its short process to the bone below and just in front of the external semicircular canal. The drum and ossicles are of course not removed, but left *in situ*. The middle ear is gently but thoroughly syringed. An L-shaped meatal flap is cut, as in a radical operation, the cartilage removed and the flap is sutured to the temporal fascia. The mastoid wound and antrum region are packed snugly, thereby furnishing support to the flap and the posterior wound is sutured.

8 East 54th Street.

TWO CASES OF PRIMARY JUGULAR BULB THROMBOSIS, NOT IN INFANTS.* **

Dr. William Ginsberg, New York.

In the practice of medicine it is important that the practitioner be taught to recognize the presence of a primary jugular bulb thrombosis, especially since this condition probably occurs more often than statistics would lead us to believe. It is, however, difficult for the practitioner to recognize this condition in its early manifestations, especially since he is accustomed to look upon jugular bulb and sinus thrombosis rather as a complication of an acute mastoiditis and not as primary infection. The jugular bulb and sinus may, however, become the seat of an acute infectious process without any manifestations of an intermediary mastoiditis.

The diagnosis of primary jugular bulb thrombosis depends essentially upon three factors, namely, *1*, a sepsis which cannot be explained by any other demonstrable lesion; *2*, a purulent otitis media; and *3*, a positive blood culture. The presence of a positive blood culture is, however, not a constant factor, for even in cases in which a thrombus of the jugular bulb is present, the blood culture is not always positive at the first examination. This may be due to the fact that the blood culture may have been taken before a bacteremia had been established, or that the bacteria are in the blood in such small numbers that they are not found in the small amount of blood taken for the culture. It may also be that there may be an uninfected obturating clot below the infected thrombus, thus preventing the bacteria from entering the circulation. The best time to take a blood culture is at the height of a rise in temperature, for very often bacteria are disseminated into the blood stream from an infective focus only at certain intervals which manifest themselves clinically by chills, sweats, and very high temperature.

It has been my good fortune to follow the complete course of two cases of primary jugular bulb thrombosis within the past six months.

Case 1: S. F., age 19 years, admitted to the service of Dr. Samuel J. Kopetzky at the Beth Israel Hospital on Nov. 5, 1924, complaining of a discharge from the right ear, fever, and pain in the

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*From the Oto-Laryngological Department of the Beth Israel Hospital.

**Read before the Section on Otology, New York Academy of Medicine, May 8, 1925.

left chest anteriorly. His family and past history were negative. His present illness began two weeks before admission, when the patient complained of malaise and loss of appetite. These symptoms persisted for one week, accompanied by a low grade fever. At the end of a week the patient began to complain of a sharp pain in the right ear. The following day a right myringotomy was done and pus was found. His temperature that day rose to 105.6° and he entered Beth Israel Hospital on the following morning. At the time of admission to the hospital he complained of sharp pain in the anterior part of the left chest, aggravated by deep breathing. There was no history of cough or headache.

Physical examination on admission revealed a poorly nourished and acutely ill patient. There was a systolic murmur at the apex which was transmitted to the left axilla. The heart was not enlarged. Moist rales were present at the bases of both lungs posteriorly, and the pharynx was markedly congested. Aural examination revealed an absolutely normal condition of the left drum and mastoid region. The right drum was congested and there was a moderate purulent discharge. Deep pressure over the mastoid elicited a moderate amount of pain. The urine on admission was negative and the blood count showed 4,000,000 red cells with a hemaglobin of 90 per cent; 19,000 white cells with 90 per cent polymorphonuclears. The temperature was 103.8,° pulse 88, and respirations 36. Immediately after admission the temperature rose to 106.4.° Culture of the pus from the right ear showed the presence of streptococcus hemolyticus. A lumbar puncture was done and 10 c.c. of clear fluid under slightly increased pressure was removed. This fluid contained thirty cells per cubic centimeter, of which 90 per cent were polymorphonuclears. Culture of the fluid was negative. Blood Wassermann and chemistry were negative. Blood culture on the day of admission was negative. X-ray showed a clouding of the left mastoid cells, the right cells being negative. There was a slight clouding of both frontal sinuses.

It did not seem offhand that the local condition of the ear could account for the extreme prostration and high temperature of the patient, and in view of the presence of a pharyngitis and bronchitis, a tentative diagnosis of a beginning pneumonia was made by all except Dr. Kopetzky, who claimed that it was a primary bulb thrombosis in spite of the negative blood culture. On the following day the patient developed a chill and a temperature of 106,° and Dr. Kopetzky advised immediate operative interference. The operation was performed by one of the staff adjuncts, who opened the

right mastoid and found the cells sclerosed. The sinus and dura were not exposed, the operator being misled by the evidently negligible gross pathology in the mastoid cells and believing the condition to be pulmonary in origin. The patient's temperature following operation ranged between 99.4 and 101° until the third day, when it rose to 104,° and thereafter ran a septic course ranging between 98 and 105,° accompanied by chills at irregular intervals. Daily blood counts showed a red cell count of approximately 4,000,000 cells with a hemaglobin of 75-85 per cent. The white cells ranged between 10,000-19,000 with 70-85 per cent polymorphonuclears. Blood cultures on the third, fifth, ninth and eleventh days following operation were sterile. Dr. Kopetzky advised immediate exploration of the sinus and jugular bulb, but the parents of the patient objected to further surgical intervention. On the seventeenth day following operation the parents consented to a secondary operation, which was performed by Dr. Kopetzky. The right sinus was exposed and plugged off above and below. The sinus was then opened and a thrombus was found therein occluding it down to the jugular bulb. The condition of the patient at this time was extremely poor and it was thought inadvisable to subject him to a prolonged anesthesia. In view of this fact, as much of the thrombus as possible was removed in the hope that he would rally after the operation and at some future date be better able to withstand a second exploration of the sinus and bulb. The right internal jugular vein was then ligated.

Blood culture taken two days after the second operation revealed the presence of streptococcus hemolyticus one colony to the plate, and ten days later showed the same organism one hundred colonies to the plate. The patient was then given transfusions of 300 c.c.m. of blood at frequent intervals. The temperature following this operation ranged between 100-103° and the patient was very drowsy and complained of pain over the right side of the head. It was then decided to again explore the sinus, and on the ninth day following the second operation the sinus was again explored and a thrombus was found at the jugular bulb. The sinus was also cleaned out posteriorly until moderate bleeding ensued. The temperature following this immediately began to drop until it reached normal on the seventh day following operation and remained there until the patient's discharge fifteen weeks after admission. Subsequent blood cultures were all sterile.

The eye grounds revealed an interesting picture, being normal on admission and remaining so for one month. A bilateral choked

disc was then noticed, which persisted for six weeks and then gradually began to recede until it had entirely disappeared at the time of discharge. It is rather hard to explain the mechanism in the production of this bilateral choked disc in view of the fact that there were no definite localizing signs, a normal cerebrospinal fluid, and no evidence of intracranial hemorrhage during or after the operation.

Case 2: S. V., age 8 years, admitted to the service of Dr. Samuel J. Kopetzky at the Beth Israel Hospital, complaining of fever, discharge from the right ear, and pain in the right hip joint. The past history was essentially negative except for a tonsillectomy and adenoidectomy performed two years before admission.

Two weeks before admission the patient complained of pain in the left ear. This subsided in a few days and then she began to complain of pain in the right ear. The right ear drum was incised with a resultant purulent discharge, which was followed by a septic temperature. The discharge gradually diminished in amount but the septic temperature persisted, ranging between 100-106.° Four days before admission the patient had a chill, which lasted for fifteen minutes. On the night before admission she began to complain of pain in the right hip.

Physical examination on admission was essentially negative except for marked pain in the right groin on manipulation of the right lower extremity. There was, however, no evidence of any bone involvement. The right ear drum was congested and there was a very slight purulent discharge, which on culture was found to be streptococcic in origin. There was no mastoid or jugular tenderness. The left drum was absolutely normal. The temperature was 102,° pulse 134, and respirations 26. The urine was negative and a complete blood count showed 4,000,000 red cells with a hemaglobin of 65 per cent, and 11,000 white cells with 59 per cent polymorphonuclears. Blood cultures taken on the day of admission showed the presence of streptococcus hemolyticus, two colonies per plate on two plates. X-ray of the mastoids revealed clouding of the right mastoid cells with normal cells on the left side, while the plates of the hips, sinuses, and chest were negative.

A diagnosis of primary bulb thrombosis was made and the patient was operated on by Dr. Kopetzky. The right internal jugular vein was first exposed, ligated in two places and the vessel cut between the ligatures. This was followed by a right mastoidectomy which revealed a hemorrhagic type of mastoiditis. The sinus was then exposed and plugged off above and below and the sinus opened.

On removing the upper plug there was free bleeding. The plug was then replaced and the lower one removed, but no bleeding followed. The lower end of the sinus was then probed and curetted down to the bulb, following which free bleeding resulted. The lower plug was then replaced and a third plug placed in the exposed sinus. The wound was packed and left wide open. A septic temperature ranging between 100-104° persisted for one week following the operation and then dropped to normal, where it remained. Two blood cultures following operation were sterile. The wound gradually healed and the patient was discharged as cured, twenty-three days following operation.

COMMENT.

In reviewing the foregoing cases, the following conclusions may be drawn:

1. Primary jugular bulb thrombosis may occur with or without the presence of an accompanying mastoiditis. In the absence of an involvement of the mastoid cells, the infection takes place through a probable dehiscence in the floor of the tympanic cavity into the jugular bulb.

2. In the presence of an unexplainable sepsis with a purulent otitis media, a primary jugular bulb thrombosis should be suspected, especially if the blood culture is positive. It therefore behooves the operator in such cases to explore the sinus and jugular bulb in addition to curetting the mastoid cells, regardless of whether or not there are any apparent destructive changes in the mastoid bone.

Beth Israel Hospital.

NEW INSTRUMENT: THE SINUSCOPE.

Dr. Maxwell Maltz, New York City.

Efforts to examine the maxillary sinus to detect pathological processes of its mucosa date back to the advent of the modern cystoscope, and it was only a natural course of events that the observant rhinologist would take advantage of an electrical-optical instrument for his own specialty. Neither rhinologist nor oral surgeon gainsays the fact that a proper examination of the interior of the antrum without the necessity of an operation, if possible, is of considerable moment if he wishes to conscientiously and intelligently treat affections of this accessory sinus. Cystoscopy is of indispensible value to the modern urologist in his interpretation and treatment of pathological discrepancies in the bladder. And in the same way, "sinuscopy" if practical should be an important aid to the rhinologist in his treatment of disturbances in the antrum. The examination of the maxillary sinus shall receive the most consideration in this article since of all the nasal accessory sinuses it most frequently bears the burden of pathological changes.

It is known that often a needle puncture of the antrum will lead to an erroneous interpretation, for the return flow may be clear yet there may be polyps or thick pus in the cavity, pus that cannot come through so small an opening. The value of a direct examination of this accessory sinus is thus apparent.

The X-ray examination is also of definite importance to the nose and throat surgeon. In this particular field the author has had considerable experience here and in the important ear, nose and throat clinics of Europe, where he has demonstrated and used his own X-ray methods (The Laryngoscope, July, 1924). He has seen a few thousand cases and there is no doubt that with proper technique the developed X-ray plate will reveal pathological changes in the accessory sinuses if there be any, but unfortunately this is only a general admonition of the changes going on. Though occasionally polyps and dental cysts could be demonstrated, it was never really definite, but a matter of conjecture. The X-ray plate cannot inform the surgeon of the true character of the lesion, but is the harbinger of bad news. And that is all.

Since the X-ray examination is so important an aid to the rhinologist, a direct examination of the maxillary sinus, if practical, should

be of extreme importance since changes in the mucosa can be readily visualized. Time and time again the rhinologists have reported their efforts to examine the antrum of Highmore and different electro-optical instruments were used and here and abroad the process has generally been called antroscopy. But the great majority of nose and throat surgeons have abandoned this method of examination because no real small instrument was manufactured to make this procedure nothing more than a diagnostic puncture, for the use of bulky optical instruments is an operation in itself. In order to make sinuscopy or the procedure of examining the maxillary sinus practical and simple, two factors must be considered: *1*, the instrument devised must be as small as possible so as not to produce too much trauma; *2*, its optical system must be such that a good observation of the mucous membrane can be had even if the prism of the instrument be held directly against the mucous membrane. One should see clearly and distinctly when the instrument rests upon any part of the mucosa. And here was the trouble, outside of the bulk of the instrument. The author has kept these important factors in mind and after a year's experimentation has perfected the smallest optical instrument ever made and still very practical and easy to use.

The success of examining the maxillary sinus depends upon the production of the least possible trauma which in itself is dependent upon the calibre of the instrument. A trocar and canula is used so that after the puncture, the optical instrument fits into the canula. The smallest instruments made heretofore averaged from 4 m.m.-3.5 m.m. in diameter. The author's instrument, "The Sinuscope", is the smallest ever made and is only *2.6 m.m.* in diameter. The diameter of the optics is *1.5 m.m.*, and the remarkable thing about this instrument is that, despite its very small calibre, one sees even more distinctly than with the older instruments. This is attributable to the fact that the author has used a new optic for his instrument, called at present "the lupus optic". This optic is specially constructed to see objects distinctly even when held directly against the object, an advantage over the older optical systems. Besides, since it is essential to obtain a good view of the whole of the maxillary sinus, the author has made use of a *"prograde"* prism. This prism is so constructed that one can see 20° more forward than with that of the other instruments. And thus no part of the antrum is overlooked. The image is slightly magnified right sided and upright and interpretations are easy. Besides, to make the procedure even still more practical, the author has made use of his colored dioptric glass filters, a new principle. Prof. Ringleb has been using colored

glasses for cystoscopy, but after considerable experimentation with differently colored optical lenses, the author has acertained that sinuscopy with the aid of a green glass filter of very thin calibre brought polypoid degenerations and mucopurulent discharges forward and better to view and threw the rest of the mucous membrane out of view. In other words, pus and polyps in the maxillary sinus are more readily discernible with the aid of the green glass. And if one uses the author's mixed colored glass filter, one-half green, one-half blue, an even greater plastic effect is obtained for the polyps and purulent discharge stand out even more prominently. But to train one's eye it is advisable at the beginning to use the simple green glass. On the other hand a yellow lens will bring the inflamed mucous membrane to better view and will throw all else in the background. For cystoscopy Prof. Ringleb uses a blue glass filter for purulent processes but according to the author's experience the green glass or the green-blue glass filter is far superior to the blue lens. The author has made a preliminary experimentation with these colored lenses on over 200 cadaver cases and their value was definitely demonstrated. And just to digress for a moment, the author is at present using this idea of colors in making colored laryngeal and nasopharyngeal mirrors, the green to bring to better view purulent processes in the larynx, and pharynx, and the anemia of tubercular origin; the yellow, for inflammations. A blue mirror is constructed for dental use.

TECHNIQUE OF USING SINUSCOPE.

To avoid blood particles from falling upon the prism or bulb, a trocar and canula are used before introducing the Sinuscope into the antrum. The maxillary sinus is penetrated by means of the trocar and canula, the trocar is removed and the Sinuscope is introduced through the canula. The internal diameter of the canula is 2.6 m.m. All the instruments are straight, making the different procedures very simple. To the canula is attached a removable hand grip facilitating the examination of the antrum, since the canula can be held in place with one hand during the process of sinuscopy. And in order that neither canula nor Sinuscope move too readily when the latter is inserted into the antrum, the diameter of the caudal end of the canula can be narrowed by means of a key so that the optical instrument fits snugly and firmly into the canula. Thus unnecessary movements of the instruments are avoided during the examination.

The technique of introducing the Sinuscope is simple and one of two procedures can be employed:

a b

Fig. 1. a. Sinuscope. b. Colored glass filter.

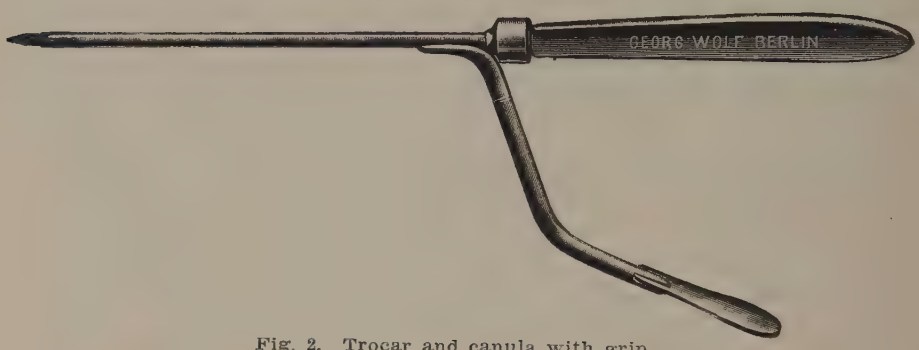
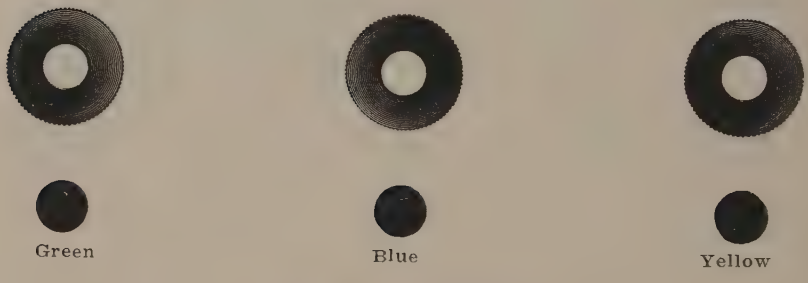


Fig. 2. Trocar and canula with grip.



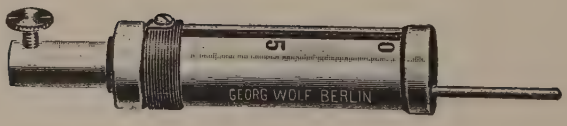


Fig. 4. Rheostat.

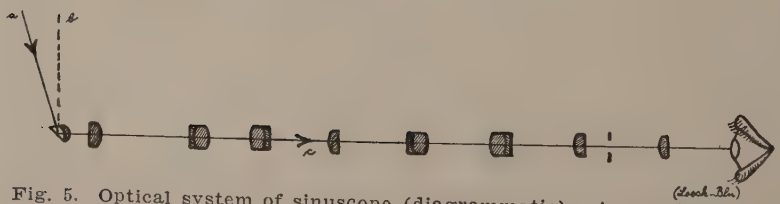


Fig. 5. Optical system of sinuscope (diagrammatic). Arrow A indicates the visual field (prograde) of sinuscope. One can thus see 20° more anteriorly than with older prism, whose visual field is represented by dotted line B. AC is the direction in which the rays of light pass from object to eye.

1. The Canine Fossa Route: The mucosa overlying the canine fossa close to the bone of the facial wall of the maxillary sinus is injected with 1 per cent novocain solution. After ten to fifteen minutes, by use of the index finger of the left hand, the trocar and sanula are introduced into the antrum by applying moderate pressure with the palm of the right hand held against the head of the trocar. The surgeon should direct the trocar against the thinnest portion of the facial wall of the antrum. Since the anterior antral wall is directed downward and outward, to facilitate the penetration of the antrum the trocar should be directed slightly outward and not in the direction of the nasal fossa. One also must keep in mind the exit of the infraorbital nerve and should not penetrate the maxillary sinus too high up in the facial wall. Once the antrum is entered, the trocar is withdrawn, the canula being steadied by holding its handle with the left hand, and then the Sinuscope is introduced through the canula and the antrum is inspected first without the colored glass filters, then with them. If desirable, the antrum can be irrigated at first. If penetration of the sinus is difficult, a slight tap with a mallet on the head of the trocar will render the procedure more easy.

2. The Nasal Route: The anterior third of the inferior meatus is packed with 5-10 per cent cocain solution adrenalized. After waiting fifteen minutes the packing is removed. The trocar and canula should then be inserted into the anterior part of the inferior meatus, care being taken that the point of the trocar rests against the anterior border of the inferior turbinate at the point where it joins the outer nasal wall. The instrument is directed at an angle of about 30° to the outer nasal wall, the head of the trocar pointing slightly upward and outward. The left hand is placed around the head of the patient for counter pressure and then the lateral nasal wall is punctured at its most anterior-superior part by directing a moderate degree of pressure with the palm of the right hand against the head of the trocar. Here again the mallet can be very effectively used if too much resistance is encountered. On entering the maxillary sinus the trocar is withdrawn and the same procedures are followed as outlined in the method of penetrating the antrum via the canine fossa route. If the surgeon desires he can directly anesthetize the mucous membrane of the anterior third of the inferior meatus with a 1 per cent novocain solution adrenalized, instead of using the cocain packing. After waiting fifteen minutes the antrum can then be entered.

The technique is simple either by the canine fossa route or by the nasal route ,but the author prefers the former, since by this procedure one can more readily examine the ostium or osti of the sinus. One cannot, with a straight electro-optical instrument, visualize the ostia by way of the nasal route particularly when the medial wall of the antrum is more convex than otherwise.

The instrument is called Sinuscope because the author has been making an effort to perfect an optical instrument that could be used not only for the maxillary sinus, but also for the opened sphenoidal or frontal sinus. With this Sinuscope the author was able to examine the mucosa of the sphenoidal and frontal sinuses on numerous cadavers, once these sinuses were slightly opened. How far the Sinuscope can be used practically on the living remains to be seen, since the ultimate success of employing this instrument for the sphenoidal and frontal sinuses will depend on how far one is able to control bleeding. At present the author is trying to perfect techniques that will make the procedure of examining these two sinuses practical. Two other models of this Sinuscope are made. One has the electric bulb curved 18° so that it be slightly easier to enter the frontal sinus once the aggar nasi is removed. But in order to avoid too much trauma while examining the maxillary sinus, a third model was devised by the author. This model has the same curve of 18° but has openings above and below for the electric bulb and optical prism. The whole optical system can be rotated by just turning the observation telescope, though the rest of the external part of the instrument remains stationary. Thus when examining the maxillary sinus with this model of the Sinuscope, the instrument remains stationary. The upper part of the antrum is first visualized and then by just turning the head of the instrument 180° one can visualize the lower part of the sinus. These openings above and below for the prism and electric bulb avoids unnecessary turning of the whole instrument while examining the antrum. To both of these curved instruments are attached a trocar and flexible canula. But for all practical purposes the straight model of the Sinuscope is the best because it is the easiest to work with and the least expensive.

The author believes that the Sinuscope is the most practical instrument constructed to examine the maxillary sinus because of its smallest possible calibre and because of its optical components. And just because of its very small diameter it naturally becomes the handiest instrument to use for ordinary nasal endoscopy. And while examining the ethmoidal ostia, the frontal sinus ostium, the antral,

or sphenoidal ostia, or discharges in the middle meatus or such, the value of the colored glass filters becomes apparent. The Sinuscope is also very useful to examine the ear after a radical mastoid operation, to study the healing and dermatization of the cavity.

Since the electric bulb of the instrument stands but three volts an ordinary battery can be used, to which is attached the illustrated small rheostat, and thus the amount of voltage can be easily regulated.

IMPRESSIONS.

1. The Sinuscope, because of its calibre and optical system, is the best possible instrument for examining the maxillary sinus. And this method of examination offers invaluable aid in diagnosis, relegating the operative case from the non-operative case.

2. Proper X-ray examination is very valuable, but the use of the Sinuscope furnishes more definite data. The X-ray plate warns the surgeon that there is some pathological change going on in the sinus if the plate evinces a clouding of the sinuses. The cause of the clouding is definitely determined by the use of the Sinuscope.

3. The use of the glass filters enhances the value of the Sinuscope, since the different filters bring out to more advantage the different pathological processes.

4. The size of the Sinuscope, together with the use of the glass filters make the instrument the most desirable nasal endoscope.

The Sinuscope was demonstrated in the more important rhino-otological clinics of Germany, in Naples, Italy; Amsterdam, Holland; London, England; Paris, France, and at the German Ear, Nose and Throat Congress in Munich, May 27-30, 1925.

The instruments are manufactured by Georg Wolf, 18 Karlstrasse, Berlin, Germany. The lupus optic was developed by Mr. Loeck, physicist of the concern.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

THE ANATOMY, PSYCHOLOGY, DIAGNOSIS AND TREATMENT OF CONGENITAL MALFORMATION AND ABSENCE OF THE EAR.*

DR. JOSEPH C. BECK, Chicago.

At a previous meeting of this Association I presented a number of cases of congenital deficiencies of the ears with respect to the technical side of operative procedure of reconstruction. Today, I desire to present for your consideration some of the same cases from the standpoint of their physiology, functional tests, radiologic study and particularly the psychology and psychiatry associated with them.

It was only during the long and tedious work of this reconstruction that I noted certain phenomena as regards the psychology and psychiatry which seemed to differ from the normal or deafened individual and which led me to this study. In order that I might have some definite and fundamental knowledge on this subject, I consulted the literature, so far as textbooks and periodicals of the past twenty years were concerned and found the reference, particularly in the English or American language, so sparse as to be negligible. Schwartze, in his "Handbuch über Entwicklungsstörungen des Gehörorgans" (Textbook on "The Disturbances of the Development of the Ear"), makes some slight references to the question of mental deficiencies in cases of congenital ear deficiencies. Alexander and Moskowski, in the Archives für Ohrenheildkunde, 1910, report on the hearing of some of these cases. In 1921, Alexander and Benesi, in the Monatschrift für Ohrenheildkunde, reported more

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*Presented at the Fifty-eighth Annual Meeting of the American Otological Society, Washington, D. C., May 5, 1925.

fully on the functional tests, while Benesi, in the same number, has an article with more confirmatory work on ear deficiencies of congenital origin. Marx in Schwalbe's "Handbuch der Missbildungen des Gehör-organs", goes into detail on this subject. One of the latest contributions to this subject is that of Samuel Michel in the Monatschrift für Ohrenheildkunde, 1925, in which he describes a case from the angle of diagnosis, including X-ray examinations and functional tests, the latter being carried out with the greatest of accuracy and practical application. He calls attention to the presence of facial paresis and partial facial hemiatrophy so often associted in these cases. He further calls attention to this finding that in most cases the malformation or absence of the ear occurs on the right side, for which he offers a theoretical explanation, namely: the position of the head in utero. In following the history of alcoholism in the parents, he finds constant positivism. In his case wherein there was a spontaneous nystagmus present, the only one on record, the nystagmus was peculiar in that it was oblique. In the same number of this journal, among the transactions of the Austrian Otological Society, Karl Heidt reports a similar case. I then consulted a number of psychiatrists from whom, with the exception of one, I received very little encouragement or enlightenment. This exception was Dr. Herman Adler, Director of the Institute of Juvenile Research of Chicago, who was so kind as to interest himself considerably and studied these cases with me.

The psychological examinations, which were carried out under his supervision by his well-trained assistants, showed us conclusively that the attempt to perfect the deficient and deformed ears had a decided effect on the makeup of the individual. The psychiatric examinations verified still more our assumption that from a useless, timid person with all types of inferiority complexes, a happy personality resulted. In order to avoid repetition, I shall show these findings in connection with each case on the screen. My observations of the parents of these patients have also been very significant. All of us are familiar with the depression that is noted in the parents when their child is born with some deformity or defect, particularly about the head. This feeling of depression is most acute the first few days after the child is born and though they gradually become more or less reconciled to it. they never "get over it". Of course the parents are always expecting perfection, or at least a near approach to the opposite, normally developed ear. While such result is not likely to be obtained, at least I have never been able to accomplish it, I have yet to see an instance where there was not a

marked change for the better in the mental attitude of these individuals after attempt at correction is begun. Certainly there has never been an instance in my experience where I have met with reproach or lack of gratitude for my attempts to do something for their child.

Physical examinations: These are of extreme importance, especially in connection with the surgical requirements, since several of the cases showed congenital deficiencies or weakness in other organs of the body, as will be illustrated by the case reported post-mortem of the persistent foramen ovale. Of greatest importance, however, is the condition of the lungs and kidney function. Several of our cases developed a mild but protracted nephritis following each operation so that in one case, at least, it became necessary to desist from further operative work for the time being. In older individuals this difficulty is not so significant owing to the possibility of operating under local or synergistic analgesia.

The anatomical study of these ears is divided into consideration of the following: *a,* the external ear; *b,* middle ear; *c,* mastoid; *d,* internal ear; *e,* neighboring structures. *The external ear* may be wanting almost entirely, including a complete obliteration of the external canal, or there may be only a slight defect in the pinna or a membranous obstruction of the canal. All possible degrees and varieties of deformity or deficiency may exist between the above two extremes. In the majority of cases, there is a fair amount of tissue present, although it is so dwarfed and misshapen as to lack all resemblance to an ear. In several of my cases, wherein the one ear was small and deformed, the other, otherwise normal ear had from one to four cartilaginous protuberances in the region of the trague, often spoken of as poliotia or accessory ears, although they have no resemblance to an ear. As to the presence of *the middle ear* in these cases, one can only try to determine that fact by catheter inflation and the X-ray of a bougie in place. Being aware of the possible danger of carrying in an infection by such procedure, there being no outlet, such as the external canal, I only inflated and bougienaged one such ear, which I did with the greatest care and gentleness. While inflating, I listened, by means of an ordinary stethoscope, placing the bell end over the tragal region, and was satisfied that air was reaching the middle ear. After that I passed a radio-opaque bougie and took an X-ray picture which showed its presence at a greater length than the Eustachian tube (Fig. 1).

Very interesting were the studies of the *radiograms* of these ears, especially the mastoid process in connection with the hearing. I

have reference to the degree of pneumatization. While it is accepted that, in general, the pneumatization of a mastoid process has little or nothing to do with the hearing, I have found that this does not prevail in these patients. I shall show in the illustration that in cases wherein the congenital deformity of the external ears was associated with a nonfunctionating labyrinth, there was not the least evidence of a mastoid cell and the internal auditory meatus was not outlined. Conversely, in these cases of deformed ears, wherein the hearing was very fair, the pneumatization was marked. In one of the cases, there was an apparent absence of the mastoid cells in the normally developed, good-hearing ear, but the history, as well as the otoscopic examination, revealed that the patient had a protracted case of suppurative otitis media in that ear following measles. In the radiograms of infants, one can, as a rule, make out the bony labyrinth simply because it is one of the earliest calcified structures in the head. Therefore, in the radiologic study of infants with congenitally deformed ears, especially when the deformity is unilateral, one will note the absence of deficiency of the outline of the semi-circular canals as well as the cochlea, as compared with its presence in the opposite ear. In older children and adults, this radiologic finding of the internal ear is not of much value because the compact bony tissue does not permit the recognition of the bony labyrinth. In the anatomical examination of one of my cases after death, the findings were so instructive and interesting that I desire to place them on record, herein, in some detail.

Baby B., age 1½ years, born at a little over a seven months' term with one rudimentary ear. It was not a very strong baby and appeared to have some difficulty with circulation, although no heart lesion was made out. There were no X-ray pictures taken, this case having been one of the earliest that came under my care. Operation, which was done under chloroform anesthesia, consisted in the primary loosening up of the parts about the ear and the formation of a primitive pinna. There was an uneventful recovery from the operation and the child, as well as the wound, was doing nicely. Three weeks after operation, the baby began to fail. It was during the summer months and the little patient developed a summer complaint which terminated fatally within four days. Permission for a post-mortem was obtained. After the removal of the calvarium and the brain, which were normal, I found that the internal auditory meatus of the right (defective) side was very small as compared with the opposite side. There was, however, a nerve with the canal. Whether it was the facial, alone, or some part of the

auditory, I could not say. I was not able to trace any part of the auditory portion to the brain as I was easily able to do on the left side. Chiseling upon the region of the attic of the middle ear, there was no discernible. Neither was there evidence of a cochlea but there were vestiges of two of the semicircular canals. No mastoid cells were found. On the left (normal) side, there was a good size middle ear and antrum but no mastoid cells. However, the internal ear was normally developed. In the general post-mortem, I found that the heart had a persistent opening between the two auricles (foramen ovale). The gastro intestinal tract was that of an acute inflammatory process without peritonitis. The lungs and the remainder of the viscera were quite normal.

Functional tests: To determine the hearing in such a congenitally deformed ear, and it was principally a quantitative determination that I was after, I employed the noise apparatus as well as the Gellé procedure in the normal ear. I found that the Gellé gave the best results because the noise from the apparatus was carried over to the ear tested. The result of these as well as the vestibular tests will be in the illustrations (lantern slides) with each case. To test the vestibular apparatus in the defective ear, I was forced to depend upon the rotation of the patient and the galvanic current since the caloric experiment could not be employed. However, I tried the recently recommended .....a..... heat test by means of the diathermic current and the Barany experiment of chilling the region of the ear by means of ice packs, but obtained no response from either test.

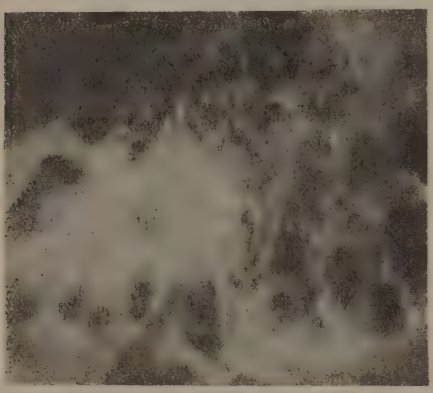
Conclusions are that: *1*, Contrary to the common but unjustified opinion of many men is the usefulness of an operative procedure in these cases, particularly on the mind of the individual as well as the parents; *2*, the radiologic findings would suggest the possibility of further investigating pneumatization in connection with the function of hearing. In the determination of the function of these ears, both of the cochlea and vestibular apparatus, one has a splendid opportunity of comparing a markedly deficient ear with one of normalcy which does not prevail in testing congenitally deaf and mute children or otherwise deafened individuals; *3*, while anatomically and cosmetically perfect results are rarely obtained, improvement is surely demonstrable; *4*, the work on this subject would not be considered finished until the embryology has been investigated and the histological examination of such a congenitally deficient ear, particularly the labyrinth, is made. It is most unfortunate that in the case I had, I did not complete this examination.

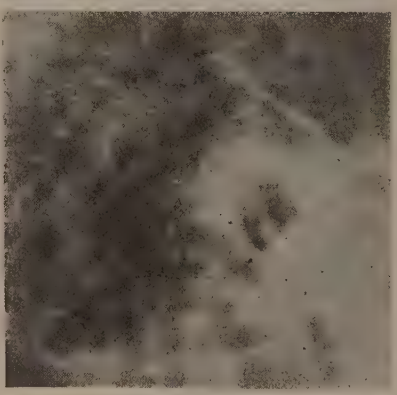
Examination: Right ear: Marked deficiency of pinna. Lobule fairly developed. Absence of tragus. External auditory canal completely blocked. Mastoid process well outlined.

Left ear: Normally developed, with presence of four accessory cartilaginous tubercles.

X-ray: Right: Large pneumatized mastoid. Bony part of middle ear clearly outlined, though hazy, due to presence of membranous obstruction. Glenoid fossa and condyloid process normal.

Left: Large pneumatized mastoid. Clearly outlined external auditory canal. Glenoid fossa and condyloid process normal.





Functional tests: C. V.: right, 3 to 10 feet; left, normal. W. V.: right, contact; left, normal.

Gelle test: 3 to 5 feet (noise apparatus in left ear). Monochord heard on both sides, though somewhat less distinct on right. Tuning forks, g^1 to c^4, all heard indistinct, as compared to left, which are heard.

Weber test: Lateralizes to the right.

Turning tests:

Canal	Direction		Time	Nystagmus	Duration
1. Horizontal	R.	L.	10 X in 17 sec.	Horizontal to left	18 sec.
(Head forward)	L.	R.	10 X in 19 sec.	Horizontal to right	16 sec.
2. Vertical	R.	L.	10 X in 20 sec.	Rotary to left	16 sec.
(Head back)	L.	R.	10 X in 20 sec.	Rotary to right	12 sec.
3. External	R.	L.	10 X in 20 sec.	Vertical down	19 sec.
(R.E. to shoulder)	L.	R.	10 X in 20 sec.	Vertical up	12 sec.
(L.E. to shoulder)	R.	L.	10 X in 20 sec.	Vertical up	15 sec.
	L.	R.	10 X in 20 sec.	Vertical down	15 sec.

Past pointing: After turning normal response on both ears.

Falling test: Normal response after turning, though somewhat slow on right.

Galvanic electric current and diathermia caloric: Intolerable. Negative.

Hot and cold water: Normal response on left.

Barany's chilling test: Negative on both sides.

Physical examination: Negative in every particular.

Psychological and psychiatric examination: The intelligence test disclosed that the patient has a mental age of 15 years, 9 months, which with his chronological age of 21 years, 10 months, gives him an intelligence quotient of .96, indicating adequate intelligence.

He has very good ideational memory, and thus is able to remember a passage which contains a consecutive train of thought. He would be able to listen to a lecture, organize the material presented in his mind, and carry away a fairly adequate summary of what he had heard; therefore, although his intelligence is only adequate he might make a fairly good record in school or college. This test was the only one he passed in year XVIII. Among other things this means also that he is better developed on the perceptive side than would be indicated by his general intellectual level. This point might have a bearing on his adjustment to the handicap because he would be keen in his perception, but being rather inadequate on the motor side he might find it difficult to adjust. Contrasted to this is his low score in rote memory, for unassociated facts, such as dates and single items of information, he will have to resort to a notebook or stimulation from another person rather constantly.

Apparently this boy has made very good adjustment to his difficulty. He gives an account of great shyness and great difficulty in meeting people, especially girls, when he was younger. He seems quite complacent and denies any feeling of inferiority or any other incorrect adjustment to his physical deformity. Nevertheless, in his history there is some indication that the adjustment still requires a certain amount of effort. It is probably because his intelligence is only average and because he has naturally a rather placid disposition that the deformity has not caused any greater emotional disturbance. His emotional makeup seems to be rather uncomplicated and therefore he is likely to escape the undue strain such a deformity usually throws upon a more complex and sensitive nature which usually accompanies a superior intelligence. It is not likely, therefore, that this young man will suffer from a psychoneurotic manifestation, which is a point of considerable interest to the surgeon, in that he can be sure that the maximum effect of adjustment possible can be obtained in such a case as this.

Summary:

1. Psychological and psychiatric findings demonstrate the rationale, in the attempt of cosmetic effect on the deficient ear.

2. Cosmetic result obtained warrants the effort.

3. No ulterior effect from 21 operative procedures—18 being performed under synergistic analgesia.

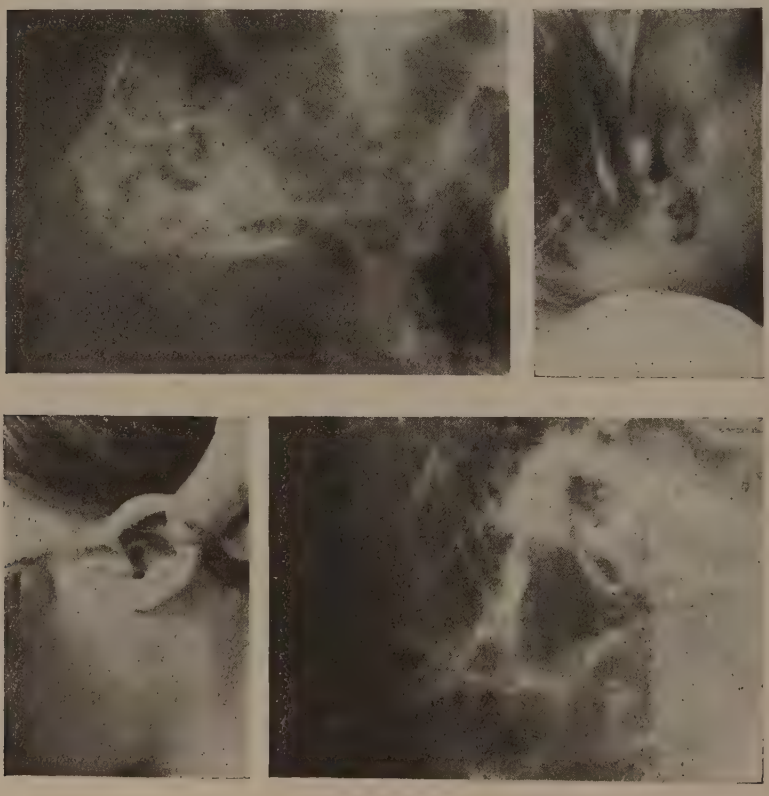
4. Absence of luetic or alcoholic history in family. Negative Wassermann test.

Examination: Right ear: Deficiency of greater portion of pinna, small rim of cartilage of Helix and a knob of a lobule present. No evidence of external auditory canal. Region of the tragus is a semicircular depression.

Left ear: Fully developed pinna. Meatus closed by membranous diaphragm, small pit below same. Presence of two accessory nodules in front of ear.

X-ray: Right: Mastoid conglomerated solid bony mass with marked changes in glenoid fossa and condyle of lower jaw. No evidence of bony labyrinth.

Left: Mastoid process large, well pneumatized. External auditory canal clearly outlined. Normal configurement of internal auditory meatus. Ramus of mandible and condyle normal.



Functional tests: Noise apparatus placed over left ear, patient absolutely deaf. Palm of hands applied over both external ears, conversational voice heard at 30 feet plus.

Tuning forks (g^1 to c^4): *Right:* negative. *Left:* All, normal time.

Monochord: High tones perceived on *right*. All tones heard clearly on *left*.

Weber: Lateralizes to the left.

Turning: *Right* to *left:* Nystagmus to left lasting 15 to 18 seconds. *Left* to *right:* Nystagmus to left.

Past pointing: Normal response after turning, in both directions.

Falling test: Normal response after turning.

Galvanic electrical current: Refused permission on account of pain.

Physical examination: Made by pediatrician showed mild degree of chronic nephritis with acute exacerbation following each etherization.

Rhinological examination: Tonsils and adenoid disease. T. and A. operation.

Psychological and psychiatric examination: The mental examination revealed the following: Chronological age 8 years, 4 months; mental age 9 years, 9 months. Intelligence quotient, 1.17. This rating indicates superior intelligence.

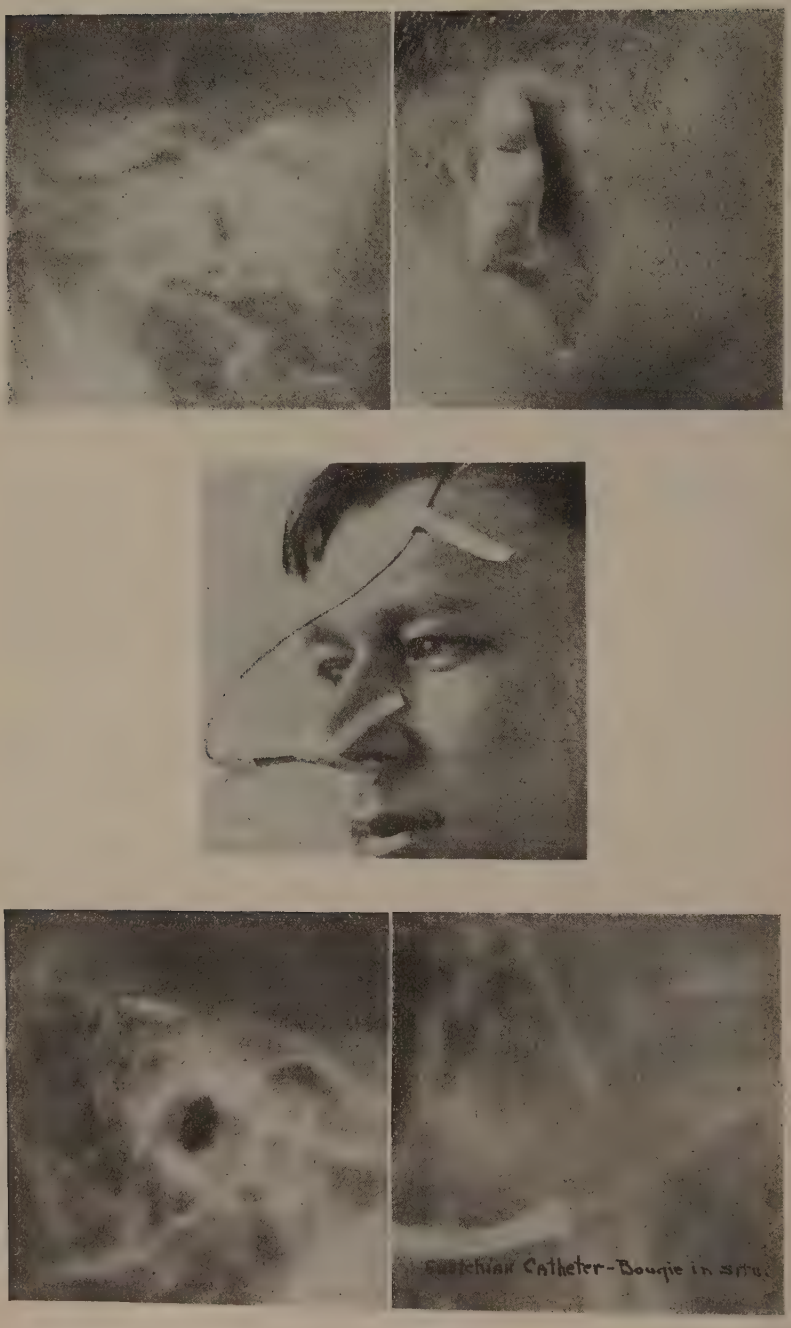
During the examination the boy exhibited great restlessness, moving about a good deal, opening and shutting drawers of the table, and interrupting the examination procedure with such remarks as: "Now I won't have time to practice my piano lesson. I like to practice. If I don't practice I can't play good." There was marked attention defect. Experience has shown that an attention defect of this sort with marked motor restlessness invariably indicates some physical pathology. The fact that the child has superior intelligence would rather increase the disturbance consequent upon the physical deformity. In spite of the boy's ability, however, he was not doing well in school.

Two obvious inferences follow from this: In the first place the physical deformity should be relieved as much as possible. The ideal thing, of course, would be to remove this entirely, but this is rarely ever possible. The effect of surgical correction here is two-fold: In the first place it will give the child some relief from his inferiority reactions. If the ear can be restored to such an extent that it does not call itself instantly and insistently to the attention of others, the child may adjust to it as a peculiarity merely, rather than a deformity disturbing to others. In the second place, the child may be given hope so that he will feel that the disability is a temporary one, which is on the road to correction.

In addition to the surgical procedure the education and training efforts should be made in the following directions: First, special training similar to the methods of oral education of the deaf, with the object of developing the motor reactions and thus stimulating the use of the intelligence which the boy possesses. Second, musical training, which will also give some emphasis to his motor expression and at the same time give him the encouragement of engaging in an activity for which he has talent, since this particular boy has musical talent. Third, supervision of recreation and of spare time, which should stimulate the boy's imagination and interests in activities which he can carry out with companions of his own age. This would also help to remove some of the inferiority reactions based on his recognition of his deformity. Under such treatment the restlessness and attention defect can be corrected and the boy can be given a great assurance, so that he will learn to bear the handicap, even though surgery may not completely remove all traces of his deformity.

Summary: The musical talent in this child being phenomenal in the playing of the piano and violin, in his being able to play some of the most difficult music and composing some of his own, therefore places the value of his left ear so high, such as to guard one in attempting to perform any surgical intervention on the existing diaphragm and obstructed canal. However, one can anticipate possible disaster in the event of an infection to the middle ear occurring.

The mental improvement in the child as well as the change in the attitude on the part of the parents towards the child can be scarcely appreciated without having been personally acquainted with these individuals.



Deformities in right external ear and canal.

Examination: Right ear: Fair remains of upper part of pinna. Absence of tragus and lobule. External auditory canal completely obliterated.

Left ear: Normally developed.

X-ray: Right: Middle ear hazy. No evidence of any mastoid cells. Extreme density in region of canals. Glenoid fossa and condyle normal.

Left: Middle and external ear clearly outlined. Mastoid well pneumatized, small cells. Glenoid fossa and condyle normal.

Functional tests: Loud C. V., right, almost contact; left, normal. C.V., right, not heard; left, normal. W. V., right, not heard; left, normal.

Gelle test: Almost contact (noise apparatus in left ear).

Tuning forks (g^1 to c^4) Right, negative; left, normal.

Monochord: Appears to perceive high tones on right.

Turning test:

Canal	Direction		Time	Nystagmus	Duration
1. Horizontal	R.	L.	10 X in 22 sec.	Horizontal to left	8 sec.
(Head forward)	L.	R.	10 X in 22 sec.	Horizontal to right	10 sec.
2. Vertical	R.	L.	10 X in 20 sec.	Rotary to left	12 sec.
(Head back)	L.	R.	10 X in 20 sec.	Rotary to right	12 sec.
3. External	R.	L.	10 X in 18 sec.	Vertical down	15 sec.
(R.E. to shoulder)	L.	R.	10 X in 21 sec.	Vertical up	16 sec.
(L.E. to shoulder)	R.	L.	10 X in 20 sec.	Vertical up	15 sec.
	L.	R	10 X in 20 sec.	Vertical down	22 sec.

Weber test: Does not lateralize.

Galvanic electric current: Intolerable. Negative.

Diathermia caloric: Intolerable. Negative.

Hot and cold water: Normal response on left.

Barany's chilling test: Negative on both sides.

Physical examination: Negative in every particular.

Psychological and psychiatric examination: The intelligence test disclosed that the patient has a mental age of 16 years, 4 months, which with his chronological age, 24 years, 9 months, gives him an intelligence quotient of 1.02. Indicating adequate intelligence.

He was rather better than average in rote memory and ideational memory. This means that he is able to utilize in his thinking not only more or less complicated logical sequences, but also isolated facts, and he should be able to retain these even though they are not associated with other facts. He has an innate capacity for correct observations and should be able to use such observations, either connected or isolated, in his thinking. He shows rather better than average ability in tests requiring ingenuity and some practical application of his perceptions. There was nothing to indicate any pathological disturbance.

The psychiatric examination disclosed some evidence of a definite compensation for his physical deformity, notably in his scrupulous attention to his personal appearance. He was not, however, overdressed. This and all the other general reactions of the patient, indicate the attention he pays in putting his best foot forward and at the same time being as inconspicuous as possible, avoiding attracting attention to himself. His history shows that he has reached a better state of adjustment than has existed previously and he himself is aware of this. Through his earlier years he struggled against his deformity by being seclusive, keeping away from others, was very shy and self-conscious in the presence of others, especially his school mates. The boy tells that he became interested in what plastic surgery could do for him through reading a book about it and that he resolved that he would take advantage of the first opportunity that occurred to gain relief from his deformity. It is obvious that this boy has suffered considerably from this and that he has made a more or

less conscious and continuous effort at adjustment. If plastic surgery can and even partially correct his trouble it will relieve him of a heavy burden and make it easier for him to bear whatever permanent deformity remains. It is a well established observation in psychopathology that persons of this sort may very well be continuously at the limit of their strength and that if any additional handicap is placed opon them, such as is unescapable in daily life, they may go over into a psychoneurosis. By increasing the margin of safety through reduction of the physical deformity and the strain it is upon his adjusting mechanism, such a danger would be either removed or at least made less imminent.

Summary:

1. Psychological and psychiatric examination findings demonstrate the rationale, particularly from the economic point of view.

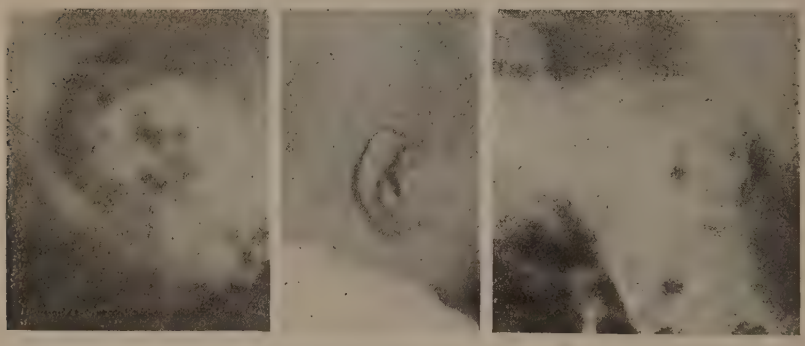
2. Cosmetic results not satisfactory as yet.

3. No ulterior effect from 11 operative procedures—nearly as many performed under local anesthesia as synergistic analgesia.

4. Absence of luetic or alcoholic history in family. Negative Wassermann test.

Examination: Right ear: Deficiency of upper portion of pinna and apparent absence of well formed meatus terminating blindly at a depth of ⅛ of an inch.

Left ear: Normally developed.



X-ray: Right: Evidence of bony labyrinth. No apparent pneumatization of mastoid.

Left: Evidence of bony labyrinth. Apparent pneumatization of mastoid.

Functional tests: All impracticable, though evidence of normal response to sound.

Physical examination: Negative in every particular.

Summary: The surgical intervention in this case was two-fold value: First, in an attempt to ascertain the presence of a bony canal as far as the middle ear, and, second, to relieve a most distressing depression of the parents, for in all my experience with these cases, this couple felt it most keenly. Both conditions were met satisfactorily, for a structure in the depth of the canal resembling the tympanic membrane was encountered and the parents were extremely happy with the effort that was made to improve the appearance of the deformed ear.

Examination: Right ear: Deficiency of entire ear, except for presence of lobule and tag. Absence of external auditory canal.

Left ear: Normally developed.

X-ray: Right: No pneumatization of mastoid. Faint trace of auditory canal. No evidence of bony labyrinth.

Left: Slight pneumatization (patient had violent suppurative otitis media when an infant). Auditory canals clearly outlined. No evidence of bony labyrinth.

Functional tests: C. V., right, 15 feet; left, 20 feet plus. W. V. (hissing sounds), right, 6-10 feet; left, 20 feet plus. W. V. (low tones), right, contact; left, 20 feet plus.

Tuning forks (g^1 to c^4): Right, negative; left, all normal time.

Galvanic electric current: Right, negative; left, positive.

Weber test: Lateralizes to the left.

Diathermia current: No response on either side.

Hot and cold water: Normal response on left side.

Turning: Normal response in all canals on both ears.

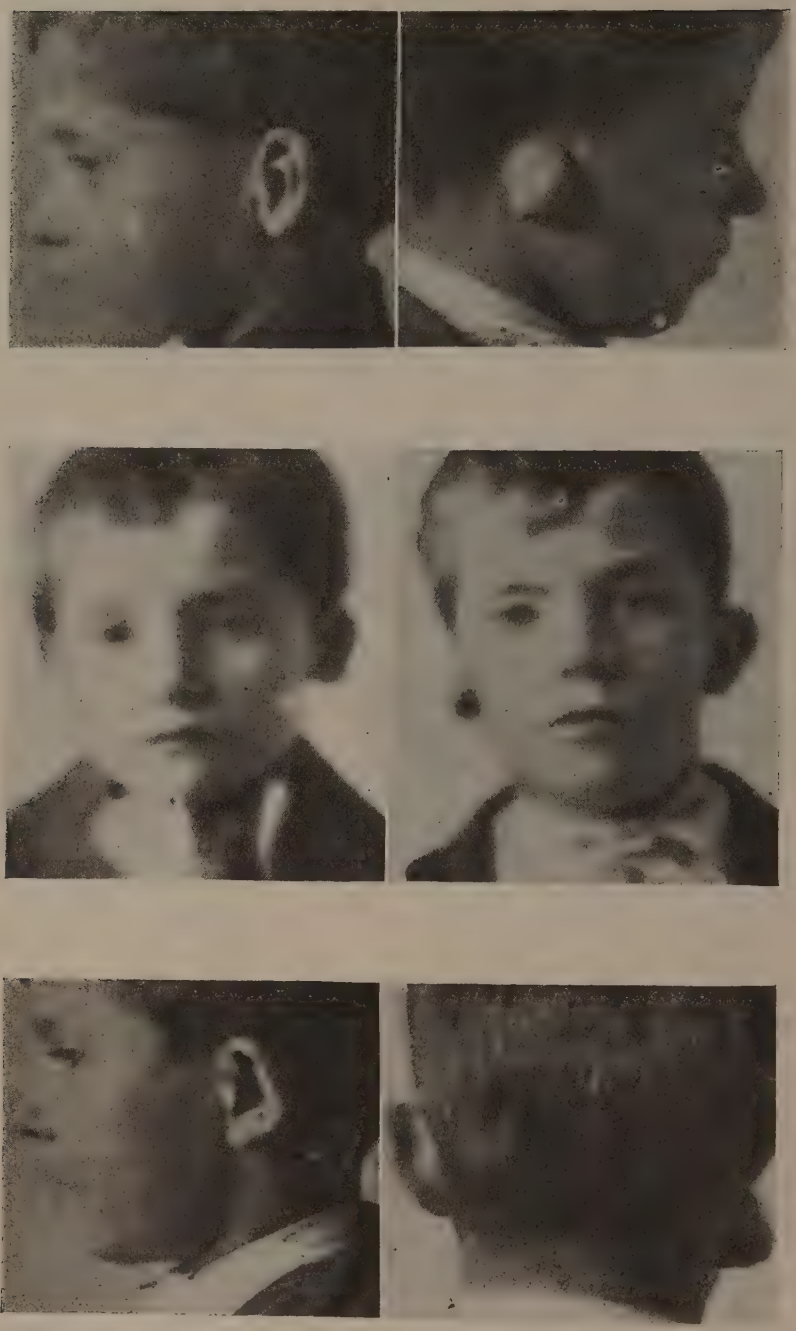
Falling test: Normal response after turning.

Past pointing: Normal response after turning.

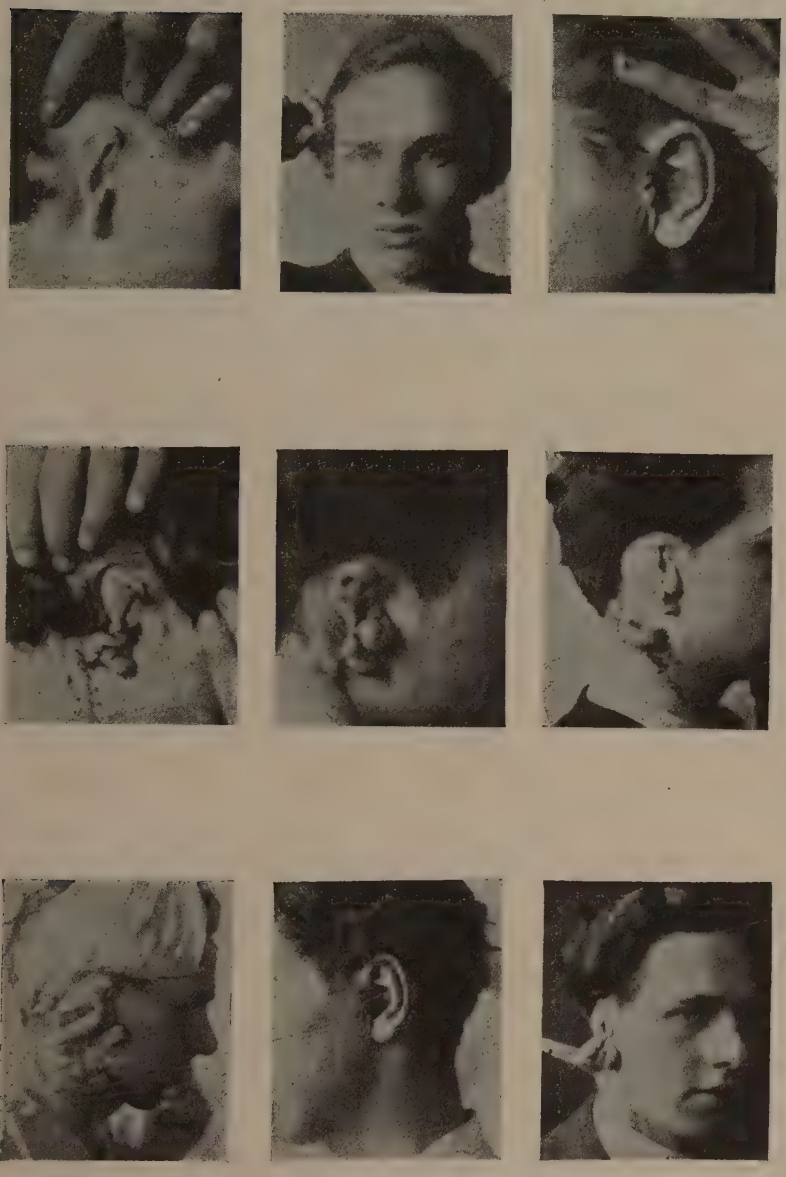
Physical examination: Negative in every particular.

Psychological and psychiatric examination: Not completed.

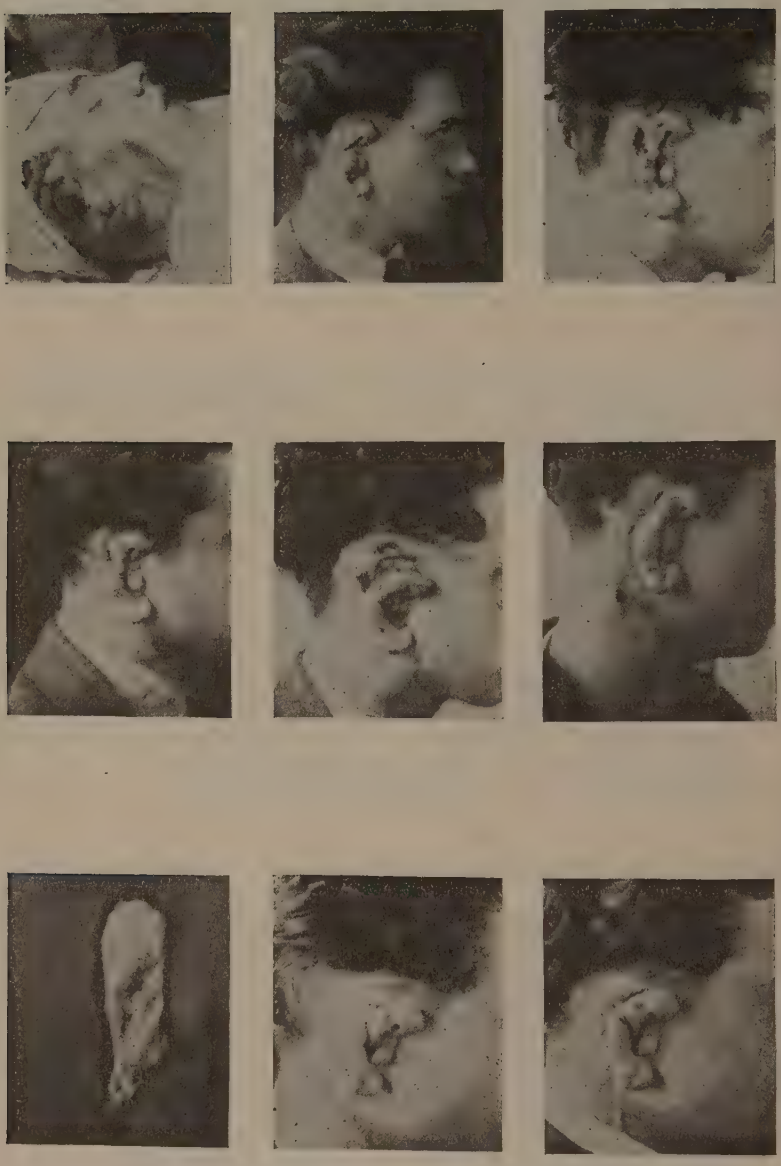
Summary: The surgical cosmetic results thus far obtained have been so poor that one would ordinarily expect the patients to quit, especially since this was a physician's child. However, the opposite is true. There has been a marked change in the psychic or mental state of the child as well as that of the mother. Particularly has this been emphasized in the child's interest in her school work. Before she was operated on she would shun the class room and now is an excellent student.



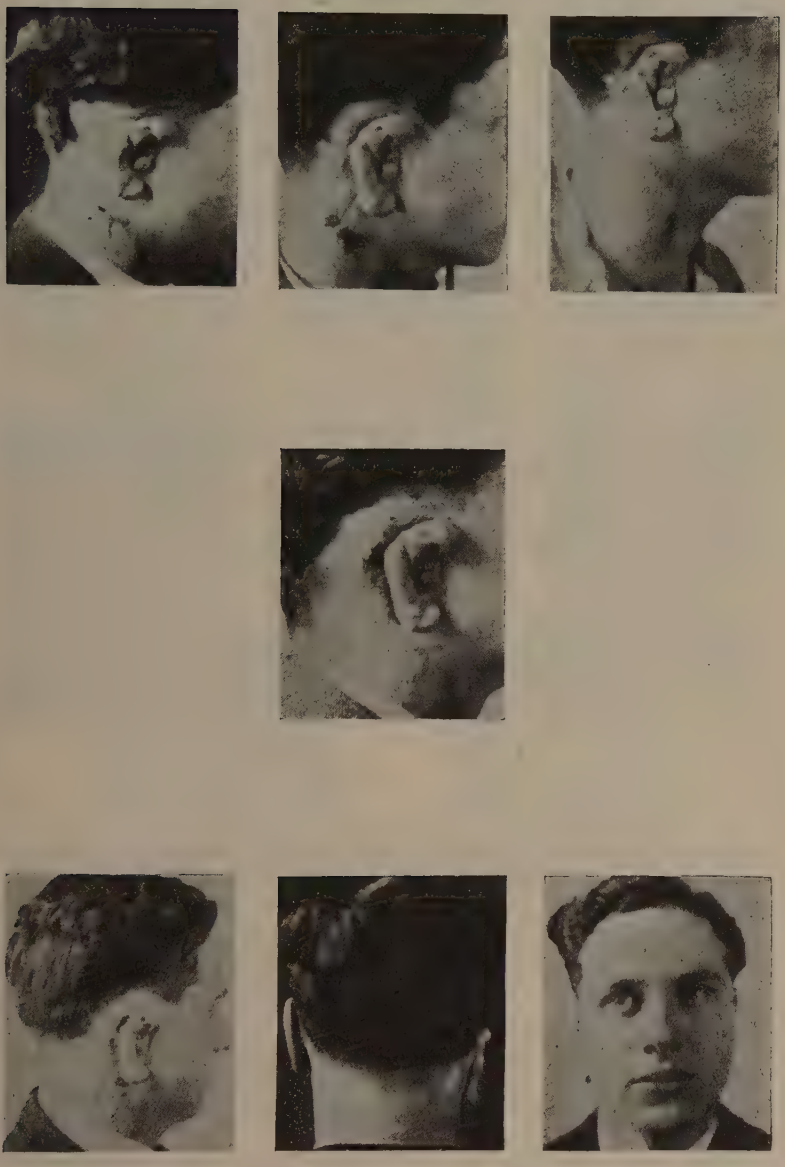
Deformities of external ear, including hemifacial atrophy in two brothers



Series of operative procedure in one case from beginning to end.
(Plate I.)



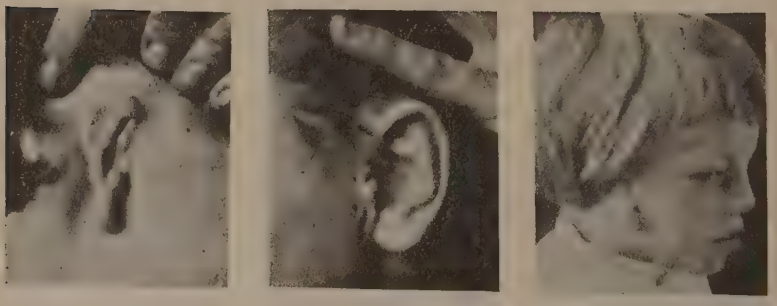
Series of operative procedure in one case from beginning to end.
(Plate II.)



Series of operative procedure in one case from beginning to end.
(Plate III.)

R L

L R



R L

Group of twenty congenitally deformed ears.
(Plate I.)

Group of twenty congenitally deformed ears.
(Plate II.)

CAUSES OF FAILURE IN CORRECTIVE RHINOPLASTY —LANTERN DEMONSTRATION.*

Dr. Jacques Maliniak, New York.

In presenting this subject before an assembly of rhinologists, I feel that I am speaking to those of our profession who are most interested and best qualified to undertake this branch of surgery. Rhinologists are familiar with nasal structures and they alone are able to diagnose nasal and paranasal diseases, which may contra-indicate plastic operations. Moreover, the rhinologist constantly sees patients with nasal deformities of traumatic or infectious origin. Corrective rhinoplasty is, in fact, often only the terminal stage in the treatment of a chronic nasal disease (syphilis, lupus, etc.) or of a nasal trauma (post-operative or accidental). Although it is logical that these operations enter into the field of rhinology there is a series of requirements indispensable to anyone who undertakes this kind of work.

I shall not be able to dwell here as much as I should like on the different aspects of this interesting subject. Therefore, I shall limit myself chiefly to the mistakes most commonly met with, as I believe that, recognizing their causes, we shall be able to avoid them.

I. General Causes of Failure.

1. Personal Factors. It goes without saying that a general surgical training and a minute knowledge of the technic are quite indispensable for success. But this is not all. Imagination, with ability to think in three planes, and some artistic inclination are not less needed in rhinoplastic surgery.

2. Necessity of Analysis. An analysis of a deformity consists of a graphic schematization of the dimensions, form and position of a defect or a superabundancy of the nasal tissues. With this analysis, a precise judgment of the different stages of reconstruction is possible. Thus, a defect of the middle part of the nose, causing the retraction of the nasal tip upwards, may mislead in the diagnosis of this deformity. Fig. 1 shows a graphic scheme of such a case with an apparent defect at (a), the real defect at (b) and the total skin defect at (c). The latter will be covered by a pedunculated skin flap from the forehead or elsewhere.

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*Read before the Ohio State Medical Society, O., R., L. Section, May 5, 1925.

The graphic scheme of the normal nose should also be impressed on the memory, since ignorance of it is often followed by failures. Four surfaces are to be remembered: (Fig 1d.)

a. The upper surface containing the bridge increases in width from the point of attachment to the end.

b. The two sides, enlarging toward the nostrils.

c. The base, wider at the attachment to the face than at its upper part.

The nose is broader and deeper at the base than at the region of the eyebrow.

3. Anesthetics. The choice and the administration of the anesthetic may influence to a great degree the final result:

a. *General anesthesia* has rarely to be employed as it compromises, the asepsis, always difficult to maintain about the mouth and nose. It increases the bleeding and therefore makes the operation more tedious. Chloroform, particularly, should be avoided as it increases the arterial pressure and favors post-operative hemorrhage. General anesthesia is, however, indicated in the reduction of recent fractures, accompanied by a marked inflammatory reaction of the tissues. It may also be indicated in nervous subjects in removing the costal cartilage after the rest of the nasal operation has been done under local anesthesia. Pharyngeal or laryngeal intubation avoids the use of a mask and the proximity of the anesthetist.

b. *Local anesthesia* may present difficulties to the unskillful. The appearance of a nasal tumefaction due to novocain infiltration partially masks the real deformity and therefore makes the exact appreciation of the latter difficult. This may be in part overcome by multiple injections of small doses of novocain, some of which is eliminated through the punctures.

4. Infection. a. *Infection due to improper technic* may be followed by irreparabe damage. Subcutaneous infection may result in the formation of a phlegmon and chronic inflammation of the nasal tissues. The region around the nose and mouth is rich in blood vessels and lymphatics and a foreign bacterial flora is easily spread.

The greatest care has to be taken in preparing the operative field. The nasal cavities should be washed with boric acid and bichlorid of mercury. They are packed during the operation with strips of iodoform gauze and isolated from the vestibules by cotton soaked in bichlorid of mercury. The hair of the nasal vestibules is cut and the region cleaned with sublimate and swabbed with 3 per cent tinc-

ture of iodin. As the endonasal incisions are made exclusively in the vestibules, with this technic, the asepsis is assured.

Great precaution should be used in the removing and preparation of free grafts. They should be handled exclusively with instruments. Their introduction by the endonasal route is done by means of a narrow nasal speculum, which separates the lips of the vestibular incision.

The precautions should be still more rigorous with the ivory prothesis which I generally introduce by an incision in the inner third of the eyebrow. During the dorsal skin separation, subcutaneous bleeding occurs and a hematoma may result if the part is not compressed at the time and after the operation. Hematoma compromises the taking of the transplant and favors suppuration.

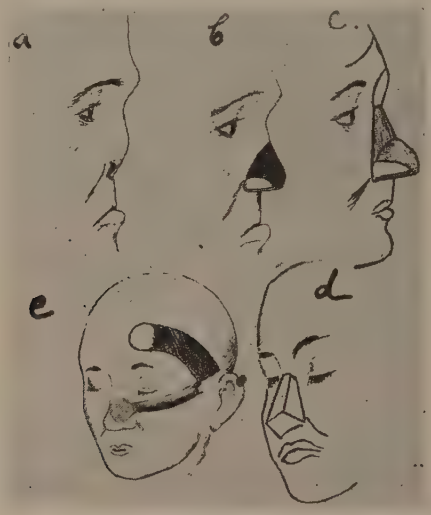

Fig. 1. (a, b, c) Graphic schematisation of a nasal defect. d, Nasal graphic scheme. e, Tubed temporal flap epidermized at its end for a partial nasal defect.

b. *Infection due to chronic diseases.* Infection in a state of evolution in the nasal cavities or sinuses absolutely contra-indicates a plastic operation. This is also one of the reasons why the rhinologist is especially qualified for this work, as he is a better judge of the endonasal pathology.

One should also abstain from interventions in the presence of eczema or any infection around the nares. In the course of a latent nasal or paranasal infection, the endonasal route should be avoided for transplant introduction. The inner third of the eyebrow or sometimes the columella (incision of Monk) should be the site of election in these cases.

Fig. 2. Correction of a middle-sized saddle deformity with an auricular cartilaginous graft.

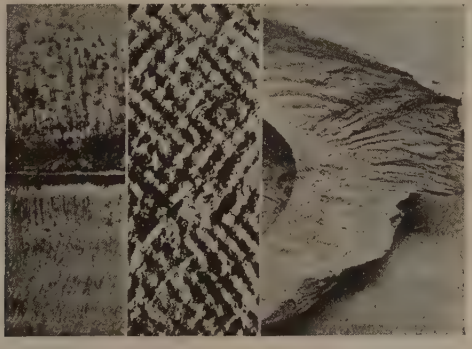

Fig. 3. Structure of ivory: bone canals appearing as small dark knots on the radiating lines. On the bottom the interior hollow part of the tusk.

Fig. 4. Correction by ivory implantation through the eyebrow.

An investigation of chronic infections, especially syphilis, should never be omitted. One avoids, thus, grave consequences. On the other hand, the persistence of a positive Wassermann test does not contra-indicate the operation, if anti-syphilitic treatment has been pursued for a prolonged period and the patient does not present active specific symptoms. Great attention should be paid in these patients to the preparation of pedunculated or free skin flaps. As a result of syphilitic endarteritis, these often show a defective circulation and necrose rapidly. Before their transplantation into the nasal defect, to be assured of their viability, it is advisable to sew the pedunculated flap back in its original bed. In this way, a certain increase of blood supply is provided for the distal end of the flap, and thus complications are avoided during the healing process.

5. *Ignorance of Some Principles in Rhinoplasty.* It is not the object of this paper to discuss in detail this vast problem but some fundamental principles will have to be mentioned as ignorance of them was the cause until late of repeated failures in this domain.

a. The presence of skin covering, nasal lining and support is essential to each nasal reconstruction.

b. The technic is more precise and the cosmetic result better by rebuilding the soft nasal parts first and providing the support afterwards.

c. The external covering is obtained from the forehead, chest (tube-pedicle flap), cheek or arm. The frontal pedunculated flap gives the best results, as it matches more nearly the nasal skin. A tubed temporal flap may be used with advantage for partial nasal defects[2] (Fig. 1e). The flap should be prepared exactly according to a tinfoil pattern of the raw surface and should be sutured at a natural tension and under gentle pressure to insure its proper nourishment. The arterial flap of Esser,[1] without skin pedicle, involves a risk on account of the danger of sectioning the vessels during preparation of the latter.

d. The great difficulties in rhinoplasty which could not be overcome by the efforts of surgeons during many centuries have been due to failure to provide a nasal lining. The experience gained during the last war finally solved this problem. This lining may be formed from the skin around the defect or by an epithelial inlay.

e. *Esser's epithelial inlay.* This method consists in epithelization of a cavity by a Thiersch graft introduced by means of a moulded piece of "Stent". This dental compound, when warm, takes the shape of the cavity. Wrapped round by the Thiersch graft (epi-

dermis inward), it is left there for ten days and when removed it leaves the cavity epidermized.

The difficulties ordinarily met with in the treatment of stenosis of the nares are largely overcome by this procedure. That of traumatic or infectious origin (syphilis, lupus) and also occurring in

Fig. 5. Removal of an osteo-cartilaginous hump with shortening of septum and lateral walls.

Fig. 6. The same as in Fig. 5. The swelling still present when photograph was taken.

the course of a rhinoplasty should be treated exclusively by this method. In providing a lining by epithelial inlay to the frontal flap before its removal we will have the frontal defect epidermized at the same time (Fig. 1e). The epithelial inlay also renders great service in the correction of a common type syphilitic saddle nose.

providing the missing lining by skin graft application to the nasal cavity. Without this, the nose continues to have, in spite of the correction by a support, a syphilitic appearance.[2]

II. CAUSES OF FAILURE IN PARTICULAR DEFORMITIES.

1. Saddle Nose. When normal skin covering and nasal lining are present in a saddle nose, providing a nasal support for the dorsum is all that is necessary. The nasal tip may need special correction. We have a choice of auricular or costal cartilage as well as ivory. Auricular cartilage may furnish a graft sufficient for middle-sized deformities and makes the use of costal cartilage unnecessary (Fig. 2). Failures, due to the curvature and the tendency to bend of costal cartilage are difficult to avoid. The removal of a fragment from the junction of the sixth and seventh costal cartilages and its use without perichondrium would lessen the chance of this. The use of celluloid or paraffin is to be condemned. Ivory (Fig. 3) being an organic substance, similar in structure to bone, is used with success, especially in pronounced nasal defects, requiring a great amount of material (Fig. 4). The comparative value of these transplants has already been described by me elsewhere.[3a] The syphilitic saddle nose with a great loss of the lining needs the replacing of the latter before the introduction of a nasal support. This is done by separating through the buccal route, the skin covering from all its adhesions, removal of all scar tissue and introducing, by the same route, a Thiersch graft on a molded "Stent" which covers all the denuded surface.[2] The nasal support is introduced some months afterwards. This method gives better cosmetic results but demands much time from the patient and the surgeon. In certain cases with limited destruction of the mucous membrane, an ivory support, reconstructing completely the lateral nasal walls as well as the bridge, may be required and will give the same result as an isolated cartilaginous transplant.[3b]

2. Flat Nose. The flat traumatic nose may often be avoided by preserving the anterior nasal spine during a submucous septal resection. The correction has to consist in lifting the nasal tip and dorsum by cartilage transplantation in the columella or at the nasal bridge. In other cases, defects of neighboring tissues (cheeks and upper lip) produce this deformity by scar retraction. In correcting the latter, the resulting deformity is overcome.

3. Short Nose. The correction of a short nose by transplantation of cartilage is a common mistake. It is the length as well as the height of the nose which should be increased. We begin by shifting downward from the nasal dorsum a reversed V-shaped skin flap

which is sutured in a lower position. The dorsum is thus lengthened. A support for it has to be provided three weeks afterwards.[3a]

4. Oversized Nose. Many types of oversized noses with infinite variations in each exist. The amount of tissue to be removed

Fig. 7. The same deformity as in Fig. 5. Less pronounced.

Fig. 8. Long hump nose previously corrected elsewhere by a wedge-shaped excision from remains of quadrangular cartilage. Failure resulted, as great part of septal cartilage was missing after submucous resection. The correction was done by me after reinforcement of the septum by cartilage transplantation.

should be exactly determined before the operation. This is necessary because the infiltration of the subcutaneous nasal tissue by novocain changes entirely the shape of the nose and misleads the surgeon, as mentioned above.

a. *Osteo-cartilaginous hypertrophy.* In an exaggerated convex profile, we may have an osseous or osteo-cartilaginous hypertrophy or a rounding of the profile. The failure most commonly met with is an irregularity of the dorsum, due to an insufficient and unequal removal of the bony and cartilaginous parts. An exaggerated flattening of the bridge also frequently follows. A subperiosteal removal of the osteo-cartilaginous hump with a saw and a thorough modeling of the bony surface with concave rasps and button knives will avoid these defects (Figs. 5, 6, 7).

b. *Bony width.* In correction of the bony width, the inward mobilization of the lateral walls has to be complete to assure a per-

Fig. 9. Arched alar cartilaginous bridge and its nasal topography.

manent result. Too often, the frontal process of the maxilla is infracted only in its lower part, leaving intact the nasofrontal connection. The incompletely infracted part in this case has a tendency to assume its former position. The angular saw introduced through a vestibular incision in front of the pyriform aperture has to be placed on the frontal maxillar process as far as the nasofrontal suture. The orbit should be protected by limiting the field of section with the thumb and index finger. The infraction will be

completed with the fingers or, if necessary, by means of the osteoclast and mallet. Permanent results cannot be assured without the daily application of a compressor for about half an hour for some weeks, beginning ten days after the operation.

c. *Long septum.* In shortening the septum, the volume, form and location of the excised segment affect the result. The form of this segment is triangular with the base anterior, or hemispheric with the convexity downward, depending upon whether the columella is straight or convex. We should avoid the removal of too large a fragment as this will cause irreparable damage. We must calculate it beforehand by lifting the columella and measuring the septal fold thus formed. The shortening will necessarily be done at the expense of quadrangular and alar cartilages (septal segment) for it is by the junction of these two cartilages that the position of the nasal tip is determined. The septal shortening done exclusively at the expense of the quadrangular cartilage, as we sometimes observe,

Fig. 10. Quadrangular excision of septal alar cartilages for correction of a protruded nasal tip.

is erroneous and will have, as a result, an ugly elevation of the tip. The lifting of the latter to the level of the dorsum is brought about by oblique sutures to each side of the cartilage. A matrass suture through the entire thickness of the cartilages will assure a good suspension. This will not occur when the septal cartilage is lacking. In such a case, before the shortening of the septum, its reinforcement by implantation of cartilage is necessary (Fig. 8). Whenever a submucous resection is done in a nose needing at the same time a shortening, the cartilage should be removed economically, saving its anterior inferior segment.

There must be a prophylactic exaggeration of the correction as the resultant traction of the scar pulls the tip backward toward the anterior nasal spine.

In a long nose the lateral walls are shortened at the expense of the triangular cartilages. The post-operative scar traction which follows is directed toward the pyriform aperture.

d. *Bulbous nasal tip.* Bulbous nasal tips may be due to bulging of the alar or triangular cartilages or both as well as to the superabundancy of the subcutaneous fat.

1. Excision of segments of alar cartilages with the adherent mucous membrane on both sides of the septum is supposed to break the arched alar cartilaginous bridge (Fig. 9). But it is the end of the bridge adjacent to the septum and not its middle part which needs to be removed. This is also true of the triangular cartilages.

Fig. 11. Corrected protruded nasal tip requiring a subsequent modeling of the shortened columella.

Fig. 12. Correction of an old fracture with lateral scoliosis and flatness of dorsum. As patient refused to provide his own cartilage, the nasal bridge was corrected by ivory transplantation.

2. When this narrowing of a tip is required in a deformity needing also a correction of the dorsum, the incision below the triangular cartilage made for this unites with the wound, resulting from the partial excision of the alar cartilage. A blind pocket formation with retention of secretion may result. Redness of the nasal tip with or without acne is not of rare occurrence in these cases. To

avoid it, I leave a narrow mucous membrane flap between the two wound surfaces making a submucous excision of the upper part of the alar cartilage.

e. *Protruded nasal tip.* For correction of advanced cases, a quadrangular fragment has to be excised from the alar cartilage of the cutaneous septum. The complete correction of the protrusion requires that the length of the defect should be greater than the length of the protruded part, since by suturing the defect its posterior edge is pulled forward (Fig. 10). The excision of a large fragment may result in the formation of a cutaneous fold in the columella, requiring a subsequent correction (Fig. 11).

3. Mismanagement of Nasal Fractures. Early recognition and treatment of the fracture is necessary to avoid functional nasal disturbance and external deformity. The fractured nasal bones and septum, easy to correct immediately after the injury, may present great difficulties to reduction at a later date. In recent cases, the lifting of the fractured nasal bone and straightening of the septum from the inside by nasal packing and the application of a lead splint is all that is required to assure a good result. Sometimes the bony nose will have to be mobilized with forceps to obtain a complete reduction.

Failure to correct a recent nasal fracture causes great difficulties in later attempts to treat the resulting scoliosis and the obstruction. When septal shortening is needed the air passages will have to be freed by economical submucous resection before the correction of the external deformity.

A simple infraction and mobilization of the lateral walls is insufficient: a wedge-shaped resection from the scoliotic wall has to be added. A disjunction of the nasal bridge from the frontal bones is not less important. The permanency of the correction will be assured by proper after-treatment with a nasal unilateral compressor (Fig. 12).

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258 Riverside Drive.

THE SIGNIFICANCE AND PREVENTION OF BLINDNESS DUE TO INTRANASAL DISEASE.*

Dr. Mark J. Gottlieb, New York.

Blindness and lowering of the visual capacity from disease of the nasal accessory sinuses is far more common than is generally supposed. The ophthalmologist who examines the visual fields for light and color perception on every patient who presents himself for treatment will attest that it is surprising to note the number of patients with concentric contraction of the visual fields without even being cognizant of it.

The causes of retrobulbar optic neuritis are not many. First and foremost among these is nasal accessory sinus disease, particularly disease of the ethmoid and sphenoid. Secondly, abscesses at the apices of teeth. Thirdly, and far less common, are all the other causes put together, and these are absorption of toxic material from the intestines, inhalation or in g estion of poisons such as lead, arsenic, acetone, etc.; diseased states most prominently among these are syphilis and probably diseased tonsils. I say the last advisedly, because from the opinion of those who see a great many cases of retrobulbar optic neuritis and from my own experience, we have no convincing evidence that the tonsil was actually at fault in any of the cases.

To enjoy a proper conception of the reason why the ethmoid and sphenoid sinuses play such an important rôle in the etiology of this malady, it will be necessary for us to review the relation of the optic nerve and optic chiasm to these sinuses. You are all aware that all skulls differ slightly in shape and size and that the relation of the optic tract to these sinuses varies also. Accordingly, any combination of relationships may be encountered in a large number of skulls.

The optic commissure very often is situated directly over the sphenoid sinuses so that disease of this sinus may easily affect the nerve at this point either by direct extension through bone necrosis or by dehiscense of the sinus wall at this point or through collateral edema and inflammation by exension from the sinuses. The orifices of the sphenoid sinuses may occur below the optic com-

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missuer, on the same level or even above it, so that the higher the sphenoidal opening the more likely is the nerve involved because the accumulation of pus will be greater and the sinus will become fuller as the orifices of the sinus is placed at a more elevated position. Because of this very intimate relationship of the sphenoid sinus to the optic chiasm amaurosis from disease of the sinus is very often bilateral.

As the optic nerve progresses forward to the eye it lies external to the posterior ethmoid cells and remains in intimate contact with this sinus for about half its length on the average. It is not more than 3 m.m. away from the sinus during the first half of its course forward toward the optic globe. According to Loeb, the average length of the optic nerve in fifteen heads was 44 m.m. The sinus portion of the nerve was 24 m.m. (average) and the free portion of the nerve was 20 m.m. (average). The nerve may lie on a dehiscence of the sinus, it may lie on the sinus or the sinus may overhang it.

The size and shape of the optic canals vary in different individuals, and the two sides often are dissimilar in the same individual. Accordingly, it may be presumed that anatomical variations of this kind may have some relation to the incidence and severity of retrobulbar optic atrophy in a given case. White (THE LARYNGOSCOPE, XXXIV., 4, April, 1924, p. 254) has made an X-ray study of the optic canals in normal individuals and those suffering with optic neuritis. He found that the narrower the canal the more extensive the pneumatization around it. Where the pneumatization is greatest, the bony wall is thinnest and more vulnerable from proximate disease. The optic canal is usually circular. A few are flattened on top; in these the pneumatization is most pronounced in the lesser wing above. When the shape is oval (rare) pneumatization occurs above and below. If the shape is triangular (very rare) there is extensive pneumatization into the bridge formed by the lateral root of the lesser wing of the sphenoid bone. Canals which are under 4.5 m.m. in diameter are usually irregular. Shape, however, is not always an indication of size. The average diameter in twenty-five normal individuals was found to be 5.35 m.m., five of these were slightly oval. The average diameter of the optical canal in twenty-five cases of optic neuritis was found to be 4.68 m.m., six of these were oval. The difference between the vertical and horizontal was found to be greater in the diseased cases than in the normal cases. Nineteen out of twenty-five oval canals showed optic nerve involvement. Of the twenty-four round canals, there were twelve

that had nerve involvement. In some acute and chronic cases, the canals were found to be large, and White believes that the disease in these is not due to direct extension, but to bacteremia or toxemia, probably from diseased teeth or tonsils. He also feels that the finding of large round canals in a patient suffering from retrobulbar optic neuritis is a contraindication for nasal accessory sinus surgery. A canal of 4 m.m. or less in a patient with severe optic atrophy suggests immediate ventilation of the sinuses. A canal of 4.5 m.m. gives more time for study, while one that is 5 m.m. or over will recover from a very acute attack, either spontaneously or as the result of local treatment.

You will naturally inquire what is the morbid anatomy which produces this condition? All observers have started work in this field with the idea that manifest purulent discharge should accompany a case of the optic nerve from an infected sinus. As a matter of fact, the presence of pus in the nose is the exception rather than the rule. The histological findings in the scrapings from the sinuses and turbinate bones are vague and similar processes may be encountered in heads wherein the optic nerves are not the seat of neuritis. The microscopical appearance of the tissues in the nose varies with the age of the patient, the state of his general health, the season of the year, the intensity of the climate, and these variations may border on disease and may be construed as pathological by one who does not correlate the clinical with the laboratorial. In most of the cases a functionless overgrowth of supporting tissues is found, but such hyperplasia is encountered in a great many sinuses and no involvement of the optic nerve exists. It is possible that hyperplasia predisposes and an infection excites an edema which compresses the nerve in its unyielding canal.

The scrapings from the ethmoid and sphenoid regions of Cases 1 and 2, reported below, were submitted to Dr. Eli Moschcowitz for microscopic study and he has been kind enough to accompany the report with a critique of the subject, which is as follows:

Case 1: The case of M. B. Both right and left ethmoids show the same structure. The slides show small sections of tissue typical of nasal mucosa, each containing a small area of cancellous bone. The glands are abundant and show no evidence of increased activity. The blood vessels show no thickening and are surrounded by a well developed erectible envelope of smooth muscle. The bone is normal and the contained marrow is fatty. The mucosa is absent in many areas, but this is an artifact. Such as is preserved shows no infiltration or desquamation. The stroma is fairly firm and is

more fibrous than the average ethmoid. There are a few areas of round celled infiltration, but they are sparse and not more abundant than the vast majority of ethmoids show. There are not eosinophiles.

Case 2: The case of I. B. Both right and left ethmoids show the same structure. The slides show one or two large and several small pieces of nasal mucosa, some containing small areas of cancellous bone. The structure is practically identical with the above, except that the stroma is perhaps more fibrous and there is no infiltration with round cells. The mucosa is everywhere well preserved.

In neither of the two specimens is there any evidence of polynuclear infiltration, either localized or diffuse or ulceration of the mucosa.

The only change in both specimens that can in any way be described as pathological is a fibrosis more advanced than that encountered in the average ethmoid. As a rule, the fibrous tissue is looser and considerably edematous. In every other respect, the picture as revealed in these slides is that of a normal nasal mucous membrane.

As far as our studies of ethmoid mucosa removed at operation, permit one to say such findings as I have just submitted are the rule. Even in patients in whom the surgeon has found frank pus coming from the ethmoid region, sections of such ethmoids reveal but slight deviations from the normal. Never does one find, as would be expected, pockets of pus, polynuclear infiltrations, mucosal ulcerations, or indeed any of the changes usually associated with chronic purulent mucosal inflammations. At the most, the only changes that one finds is a greater or lesser infiltration with round, plasma and eosinophylic cells, and a greater or lesser fibrosis.

It seems to me that disease of the ethmoids must be interpreted more interms of diseased function than in pathology. In other words, one cannot tell by mere histological study of the tissues the presence or degree of disease of the ethmoid structure. This is apparently entirely a clinical matter. While this statement may appear strange in the light of convention, there is a close analogue in another mucosa, namely the endometrium. The long condemned purulent mucoid discharge from the uterus is cemented in our minds as an endometritus, nevertheless, curettings from such cases fail to reveal any deviations from the normal. The so-called pathological changes which have hitherto been regarded as pathagnomonic of endometritis are now known to be the normal changes incident to the menstrual cycle. Indeed, there is considerable doubt among pathologists whether a chronic endometritis, aside from specific etiology, really exists.

White believes that there must be some fundamental difference, from that which is usually found, in the anatomical relation of the posterior portion of the middle turbinate to the septum which more or less crowds this part of the nasal chamber, and an acute non-purulent infection super-added would produce swelling and edema sufficient to compress all other tissues in this region and affect the optic nerve either by direct extention or collateral edema. He has found in a large percentage of cases of retrobulbar optic neuritis that the septum was deviated and crowded an already enlarged posterior portion of the middle turbinate. At times, the turbinate was found to have a large cell in its body.

Then what are the findings in the nose and by what criteria may we judge that the cause lays in the ethmoid or sphenoid? There are no criteria, the nasal mucous membrane and turbinates may appear to be normal. X-ray pictures of the sinuses are of no service, especially if the report is negative, and negative findings are the rule. One may see an enlarged turbinate crowded by a deviation of the septum in the region of the sphenoid. There may be exposed bone in the sphenoid or in the region of the sphenoid. But all of these may be absent and yet on operating on the sinuses the patient recovers when all other means have failed.

Accordingly, one is anxious to know what attitude the ophthalmologist takes toward this important subject, and Dr. Cyril Barnert has been kind enough to write for me, the following information, which I quote verbatim:

"Retrobulbar neuritis is an interstitial neuritis affecting usually the axial bundle of the orbital portion of the optic nerve. The axial bundle which innervates the macular region of the retina is a highly developed special sense organ and is more vulnerable than the remaining fibres of the nerve so that pressure on the nerve in the orbital canal, or even at the chiasm, is felt first by these delicate fibres. The small margin of safety in the orbital canal permits of but slight swelling of the nerve or its enveloping periosteum without damage to the neurons.

Retrobulbar neuritis occurs in two forms, acute and chronic. The acute form is usually unilateral, and is associated with severe headache on the same side, pain or movement of the eyeball and tenderness on pressing the eye backward. There is rapid impairment of sight, first noted as a central blur or scotoma and rapidly increasing until but a narrow peripheral field remains. The fundus shows as a rule no abnormalities, but occasionally later, a blurring and congestion of the nerve head appears. The course is rapid and the

prognosis is good if the underlying cause is found and promptly removed. The etiology is an infection from adjacent accessory sinuses, infected teeth or tonsils, acute infectious diseases, certain poisons (lead, alcohol, acetone). A recurrent type is seen as a part of a multiple sclerosis. The chronic type is more frequent, usually bilateral and may cause no symptoms, or but slight diminution of visual acuity. It is often discovered casually in the routine examination of the visual fields as a concentric contraction of the fields for form and especially those for color, with or without a relative or absolute central scotoma for forms or colors. The causes are the same as in the acute form, but of lower grade or intensity, and the treatment consists in finding and removing the cause. The recovery of normal fields and vision is lower and less certain than in the acute form."

In cases of threatened blindness from nasal accessory sinus disease of the nonpurulent character, the outlook for recovery is exceptionally bright as will be gleaned from the following case reports.

Miss M. B., age 17 years, school girl. Appeared first for examination and treatment on Feb. 11, 1924, complaining of frontal headache, tenderness over both frontal sinuses, and nasal discharge. The pain in the forehead continued after the nasal discharge had ceased, and the patient did not complain of difficulty with her eyes, but because of the fact that the headache persisted in spite of treatment, she was sent to Dr. Cyril Barnert for the purpose of a routine examination of her eyes. Surprising as it may seem, the report of the eye findings indicated that the patient was rapidly losing her sight. X-ray showed no disease of the nasal accessory sinuses The Wassermann was negative. All other causes having been eliminated, on June 13, 1924, a bilateral ethmosphenoidectomy was performed and both middle turbinates were preserved. Following the operation, the headaches disappeared. On July 29, the ophthalmologist reported a moderate improvement in the seeing capacity, with a broadening of the fields for form and color. Directly after that, however, her vision again began to be impaired and the question arose as to what procedure should be followed to prevent her vision from becoming permanently impaired. It was then decided to again attack both ethmoid areas, cut away all scar tissue, and remove both middle turbinates. This produced an immediate and progressive improvement, so much so, that on Aug. 29 her vision was found to be practically normal, and has remained so to date.

Miss I. B. referred by Dr. Cyril Barnert with the following note: "I am referring Miss I. B., who came to me this morning with a

history of rapidly failing vision in the right eye for the last ten days. Examination show normal conjunctivae, musculature, pupils, media and fundi in both eyes. There is a slight tenderness on backward pressure over the right globe. Perimetry disclosed a marked concentric contraction for form in the right eye with an entire absence of color perception. The left eye has a normal field for form and a contracted field for color with a relative central color scotoma. The vision in the right eye is reduced to counting fingers at 6 feet and can be improved but slightly with correction, although the girl stated that in an examination made while in Atlantic City a few weeks ago, the vision in the right eye was 20/20. The vision in the left eye is normal with correction of the hyperopic error.

"We are undoubtedly dealing with an acute retrobulbar optic neuritis in the right eye and a similar incipient condition in the left, and in view of the very rapid loss of vision, I would recommend an immediate exploration of the right ethmoid (and of the left as well, if practicable), even if there is no clinical or X-ray evidence of sinus disease." Signed: C. B., M.D.

X-ray pictures were immediately made and a negative report was obtained. There was a deviation of the septum in its posterior portion, the convexity of the bend being toward the right. However, this deviation did not crowd this area and it did not interfere with the operative procedure. It was impossible to probe the sphenoid sinuses.

On the following day both ethmoids were opened and all tissue removed with meticulous care. The right sphenoid was found absent and the left was very shallow, but extended deeply down into the pterygoid plate.

The patient did not improve as was expected and although the left eye became somewhat better, the right became progressively worse. This gave us a great deal of anxiety and we proceeded to eliminate causes. The Wassermann was found to be negative. The dentist found two teeth that were apparently diseased and removed them. The right eye continued to get worse, so much so that finally she could only distinguish light, and then she suddenly improved and has continued to do so ever since.

There will always be a question in our minds what the actual cause of this condition was. We are inclined to believe that the removal of the teeth had nothing to do with the result. This is one of the cases where loss of time may have spelled loss of vision for the patient. I cannot too strongly emphasize at this point, the neces-

sity of speed from the time that the patient first presents himself or herself to us with a complaint of blurring of the vision until every possible stone is overturned in an effort to prevent the patient from becoming blind.

In some cases of chronic purulent sinusitis, the visual acuity becomes gradually impaired, as a rule there is no central blurring of the vision, but the fields are contracted. This is very well exemplified in the following case:

Mr. J. S. L., age 60 years, bank examiner. Appeared first for examination on Mar. 6, 1924. For a great many years he has had a thick purulent discharge from his nose, necessitating the use of many handkerchiefs during the day, also expectorates constantly mucopurulent material which drops from the back of his nose. Catches cold frequently. For the past seven months, has experienced difficulty in concentrating his vision, principally with the right eye. When addressing the golf ball, is compelled to focus his vision repeatedly. He also complains of a mild photophobia. Mucopurulent material is seen dripping from the middle meatus on both sides, but more from the right. The right frontal sinus is cloudy, the left clear to transillumination. The antra are clear to transillumination. The right frontal sinus and antrum of Highmore are tender. He was referred to Dr. Cyril Barnert for eye examination, with the following result:

"He has a definite hyperopic astigmatism and presbyopia for which his present glasses are quite adequate. Perimetry discloses the fact that his fields are very good for form, while his color fields are relatively constricted, the right more than the left. This, however, together with his statement that he is at times conscious of a central blur makes a diagnosis of a beginning of a retrobulbar neuritis very probable. I think his sinuses should be looked into."

Accordingly, on Mar. 15, 1924, a bilateral ethmosphenoidectomy was done under cocain anesthesia. The right middle turbinate was preserved. The left was sacrificed because it interfered with the approach to the sphenoid sinuses. The sphenoid sinuses were found to be located unusually low down and in both instances extended deeply into the pterygoid plate. The right sphenoid was found to be distinctly diseased. The three days after the operation, the patient experienced a very decided improvement in his vision. This improvement continued for a few months, when difficulties of seeing began again to be manifest. On Oct. 7, 1924, he was again examined by Dr. Barnert, who found an increased constriction of the fields, especially for form. Very recently his nose was again ex-

amined, very little discharge was evident, but the patient still complained of difficulty of vision, especially with the right eye.

In the light of this and other experiences, certain lessons may be learned regarding the mode of operative procedure and the prognosis which the rhinologist should give to patients of this character. In the first instance, I am firmly convinced that the middle turbinate should always be sacrificed in a case of failing vision due to nasal accessory sinus disease. Second, in view of the fact that it is utterly impossible to open every ethmoid cell on account of the great number of anatomical variations in this field, I am now not inclined to give the patient as rosy a prognosis as I would in cases of non-suppurative inflammations of the nasal accessory sinuses.

SUMMARY.

Retrobulbar optic neuritis is caused in the great majority of cases by disease of post-ethmoidal and sphenoidal sinus.

If time permits all other causes should be excluded before operating.

Negative findings in the nose are the rule rather than the exception.

If time is precious one is justified in opening up the sinuses without further investigation.

The element of haste is so important that it cannot be overemphasized.

The middle turbinates should not be spared in any instance.

43 West 69 Street.

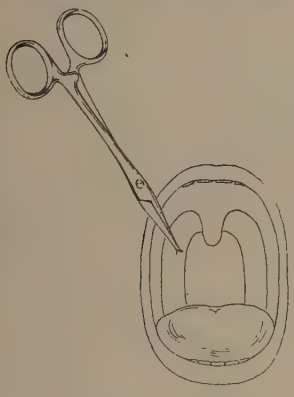
A LIGATURE SET FOR TYING BLOOD VESSELS IN THE PHARYNX AND OTHER DEEP CAVITIES.

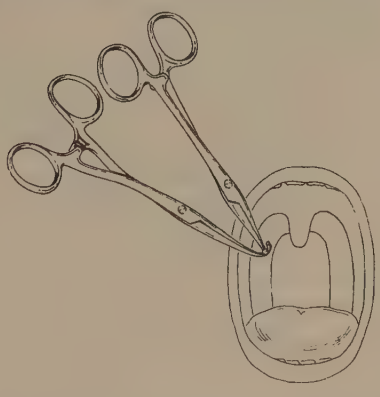
Dr. William Molt, Indianapolis, Ind.

All surgeons recognize the difficulty of tying bleeding vessels in the pharynx and other deep cavities. Even if one succeeds in passing a ligature around a hemostat by the use of a needle, it is quite often torn out during the tying process on account of the inability to get more than one finger in the proper position at a time.

In order to overcome this difficulty, I devised a curved forceps to act as a pedicle clamp; a loop carrier; a knot tying forceps and a pillar retractor.

After catching up the bleeding vessel in the usual way with a straight tonsil hemostat, slight traction is made which forms a pedi-





cle including the bleeding vessel (Fig. 1). The curved pedicle clamp forceps is then applied as shown in Fig. 2, and the straight hemostat removed. The ligature is now loosely tied outside the mouth around the shank of the pedicle clamp forceps, allowing for a loop about 2 inches in length. The loop carrier is then used to place the loop around the end of the pedicle clamp forceps (Fig. 3). The handle of the pedicle clamp forceps is then moved to the opposite side of the mouth, which secures the ligature over the end of the clamp (Fig. 4). The two free ends of the ligature are held firmly between the thumb and fingers of one hand, keeping the strands about 1 inch apart while the knot tying forceps are placed

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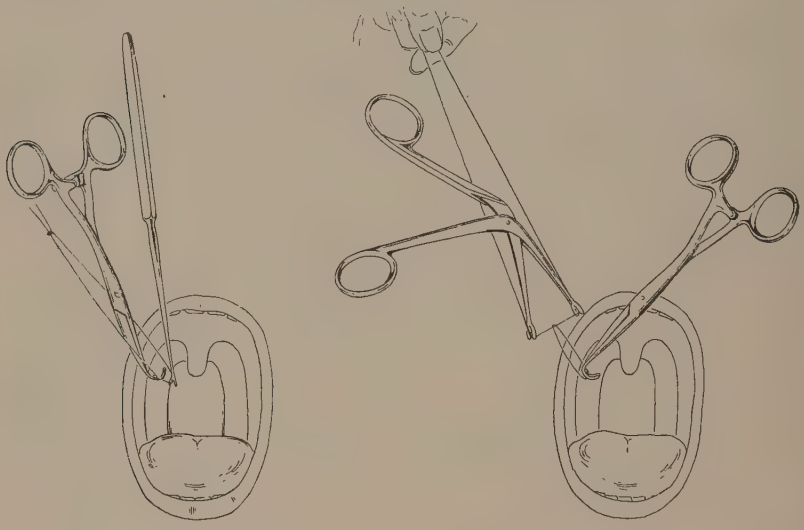
on the loosely tied knot (Fig. 4). Then by gentle pressure on the knot, together with an opening and closing movement of the forceps, the knot will slip down securely around the pedicle, which is still in the grasp of the pedicle clamp. At this point the tying forceps are opened wider and the tension is increased to the desired degree by pulling the ligature taut against the tying forceps. This tension is maintained while the assistant releases the pedicle clamp forceps.

Plain catgut (No. 1), softened by immersing in warm water, is the ligature of choice in most cases. There need be no fear of making too great tension in tying with the tying forceps as the knot is tightened by an opening movement of the thumb and finger instead



of the usual closing movement; this prevents one from unconsciously exerting too much tension. The knot tying forceps also acts as an equalizer of tension on the two strands, which insures an equal pull on both sides of the knot, regardless of the direction of the pull on the free ends of the ligature. See Fig. 4.

By using the pedicle clamp forceps and a hemostat as described it is possible to form a pedicle of any desired size containing only the bleeding vessel and the surface tissue, which may be tied without crushing any muscle tissue whatever.

These instruments are made by the Akron Surgical Instrument and Truss Company, 220 Massachusetts avenue, Indianapolis, Ind. 526-530 Bankers Trust Bldg.

TOBACCO AND EIGHTH NERVE LESIONS. REPORT OF NINE CASES.*

Dr. V. K. Hart, Statesville, N. C.

The following cases are presented because they are believed to be of extreme clinical interest. The writer has seen tobacco mentioned as a factor in chronic tubal catarrh and in auditory nerve deafness. Textbook discussions are very brief.

Therefore curiosity was aroused as to the exact part played by nicotine in nerve lesions of the internal ear mechanism. Furthermore, did it affect the eighth nerve as a whole, or was either branch apt to be involved? If either branch, was one more apt to be involved than the other? It was with these questions in mind that the following cases were studied.

It must be remembered that all these cases were private cases. Their comfort and convenience prevented some work from being done. Thus the writer would have liked to have routinely done both the caloric and the turning tests on all cases. However, having been through one, the patient frequently was not desirous of going through the other. It is believed, nevertheless, that enough data has been gathered to bring out several important points.

Some facts may be stated which apply to all the cases mentioned. To state these now will forestall monotonous repetition. In every case the Rinne was positive, *i. e.*, air conduction was greater than bone conduction. In no case was the retraction of the drums extreme, or was there marked thickening or atrophy, or abnormal relaxation. The Eustachian tubes were patulous in all the cases, though in two of them it was necessary to dilate the tubes first. The use of the otoscope in no case showed fixation of the malleus. Nasopharyngeal lesions and obstruction were absent in all cases.

There was no evidence of an intracranial lesion in any patient studied. No evidence of syphilis in any case was demonstrated, either clinical or laboratory. At no time were spontaneous past pointing or falling observed. In no case was there a chronically discharging ear and in only two a previous acute otitis media, cases 6 and 7. Tinnitus was present in case 6. Emphasis is laid on the fact, then, that an earnest attempt was made to rule out lues and

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middle ear pathology in every case. It is believed this attempt has been successful.

Case 1: A brief synopsis of the history will be given first. The patient had been having dizzy spells extending over a period of three years. They were particularly noticeable on sudden change of position. There is nothing of note as to his past medical history. He was particularly questioned as to a previous otitis media and absolutely no history of the same was obtained.

He has been an excessive user of chewing tobacco for over thirty years.

Physical findings: In giving these to prevent monotonous reading, unnecessary detail is omitted as to negative findings.

Male, age 59 years, white.

Eyes: A moderate refractive error is present which was corrected in each eye. The muscle balance is practically perfect and all other findings are negative.

Nose: The findings are essential negative.

Throat: Only finding of note is a pair of chronically diseased tonsils.

Ears: The canals show no abnormalities. The drums are of good color with some retraction of each which is not marked. The landmarks are well defined. The hearing tests follow:

Whispered voice, right, 12 ft.; left, 12 ft. C (tuning fork), right, 3/8; left, 3/8. C_1, right, 5/12; left, 5/12. C_2, right, 9/24; left, 9/24. C_8 right, 36/36; left, 36/36. C_4, right 48/48; left, 48/48. Weber not referred. Bone conduction, right, normal; left, normal.

The caloric reactions are by far the most interesting aspects of this case. Each ear was irrigated for as long as five minutes at a time with water at 68° F. No nystagmus swaying, past pointing, or nausea were induced. The irrigation was repeated in each ear, with a minimum of three minutes for each irrigation, with the head back and then with the face down. No reactions were obtained in any position. Transitory dizziness and nystagmus could be gotten by suddenly changing the position of the head.

Typical reactions were immediately induced in a nurse with the same technic. She was nauseated, fell and past pointed to the side of irrigation and had typical nystagmus to the opposite side. Moreover the caloric test was repeated on the patient a few days later with identically the same results as before. Unfortunately the patient could not be persuaded to return for the turning tests.

The patient was referred to the medical department for complete examination and all their findings were returned as negative.

Laboratory findings: Blood Wassermann negative. Complete blood count shows nothing of value. B.U.N. 11.25 mgm. per 100 c.c. Urine examination negative.

Diagnosis: Bilateral neuritis of the Eighth nerve of nicotine origin, vestibular impairment predominating.

This man's vertigo then is very probably due to a marked impairment of the vestibular apparatus. The foregoing statement is borne out by the fact that his dizziness comes on always with a sudden change of position. The writer is wholly unable to explain why the cochlear mechanism apparently escaped with little demonstrable involvement. Perhaps it will become involved at a later date if the patient continues to chew tobacco excessively. This is the only case where vestibular conduction was so markedly impaired with cochlear function as near the normal.

Case 2: This case is only briefly mentioned because it will help in an intelligent concept of the subject under discussion.

History: His chief complaint was a convulsive tic of the upper lip. His history brought out the fact that he had chewed tobacco, as he expressed it: "Ever since I could spit". He had never had a discharging ear and complained of neither poor hearing nor dizzy spells.

To save time and space, the details of his examination are omitted. His head examination was negative except for bad teeth. The medical findings were unimportant and they include a negative Wassermann. A diagnosis was made of habit spasm.

The point stressed in this case is a very definitely delayed caloric reaction in each ear. Nystagmus occurred in three minutes and a half when the right ear was irrigated and in three minutes when the left was irrigated. The hearing was apparently unimpaired.

The interpretation of this case is that the man had a very early involvement of the vestibular branch of the eighth nerve of tobacco origin as indicated by the delayed caloric reactions.

Case 3: History: The chief complaint was that of dizzy spells. He never at any time in so far as he knows has had a discharging ear. His past medical history shows that he had typhoid in 1903, malaria at the age of 12, and appendicitis in 1917, for which he was operated. He has chewed tobacco for a great many years and admits chewing as much as half a plug a day.

Physical findings: Male, age 47 years, white.

Eyes: Emmetropic. Presbyopia which is corrected by proper glasses. Other eye findings are wholly negative.

Nose: Septum somewhat irregular and turbinates congested. No pus demonstrable after shrinking.

Throat: Chronically diseased atrophic tonsils. Other findings are negative.

Ears: Canals negative. Drums of good color with slight retraction. Hearing as worked out with the tuning forks is entirely normal each ear.

The caloric reactions were present and typical in each ear. Nystagmus towards non-irrigated ear began in one minute right ear, and one minute and fifteen seconds left. Past pointing and falling were to the side of irrigation.

When examined by the medical department he was found to have a sacro-iliac subluxation. Otherwise the findings were wholly negative.

Laboratory findings: Blood Wassermann negative. Spinal fluid Wassermann negative and spinal fluid examination shows nothing of value. Complete blood count negative throughout. Urine examination negative.

It was felt in view of the above findings that the attacks of vertigo of this patient were due to a toxic disturbance of the Kinetic-static labyrinth. This was borne out by the fact that three weeks after he had very materially reduced the amount of tobacco used, the dizzy spells had practically ceased.

Diagnosis: Bilateral neuritis of vestibular branch of the eighth nerve, of nicotine origin, early stage.

Case 4: History: Chief complaint was that of dizzy spells. Had had them occasionally for the past fifteen years. He stated that he felt that he was going to fall over. They have been occurring more frequently lately. An attack lasts from fifteen minutes to an hour and he is relieved by lying down. He states that he has chewed tobacco since he was 20 years of age. There is no history of middle ear disease.

Physical findings: Male, age 55 years, white.

Eyes: He has a slight refractive error, which has been corrected for some time.

Nose: Negative.

Throat: Tonsils large and diseased.

Ears: Canals negative. Drums show no gross abnormalities. The ear record follows:

Whispered voice, right, hears well; left, hears well. Weber slightly to right. C, right, 5/8; left, 5/8. C_1, right 8/12; left, 8/12. C_2, right 18/24; left, 18/24. C_3, right, 36/36; left, 36/36. C_4,

right, 48/48; left, 48/48. Bone conduction, right, minus 5 sec.; left, normal.

Turning tests: Head 30° forward. Ten turns right in 20 seconds. Duration after nystagmus, 26 seconds. Ten turns left in 20 seconds. Duration after nystagmus, 22 seconds. Ten turns right in 10 seconds. Past pointed right. Ten turns left in 10 seconds. Past pointed left. Head 120° forward. Five turns right in 10 seconds. Fell right. Five turns left in 10 seconds. Fell left.

The patient's medical examination was essentially negative.

Laboratory findings: Blood Wassermann negative. Complete blood count negative. Spinal fluid clear and cell count normal. The state laboratory recorded the spinal Wassermann reaction unsatisfactory. Just why is not known. It is felt that it would be negative if repeated in view of the normal cell count.

This man had no middle ear lesion. There is no evidence of intracranial pathology. There are no uncorrected ocular defects. There is no evidence of cardio-vascular disease. Therefore, it stands to reason that his vertigo is probably a toxemia with a consequent early vestibular irritation. In view of his negative physical examination it is felt that this toxemia is of nicotine origin.

Diagnosis: Neuritis, vestibular branch of eighth nerve of nicotine origin, early stage.

His ear examination shows three slight deviations from the normal:

1. A diminished bone conduction of 5 seconds in the right ear.
2. A slight cutting down of the low and middle tones.
3. Slightly diminished time of nystagmus when turned to the left (22 seconds).

Any of these changes could be accounted for by errors in technique and have therefore been considered negligible.

Case 5: History: Chief complaint is that of dizzy spells which he noticed on going to bed and arising. He states that the room seemed to move about him. He has chewed tobacco for ten years.

His past medical history gives nothing of importance.

Physical findings: Male, age 43 years, white.

Eyes: Patient has a slight spontaneous nystagmus, rotary in character, labyrinthine in type with a quick and a slow component, on looking to right or left. It is more marked to the left. He has a small amount of hyperopia and a presbyopia. The latter was properly corrected when he came under observation. He has since been given a bifocal lens. The other eye findings are negative.

Nose: Negative.

Throat: Small atrophic tonsils.

Ears: Canals negative, drums show no gross abnormalities. There is a slight decrease in bone conduction of about 4 seconds in each ear; otherwise the tests are quite negative throughout. He hears all tuning forks well. Furthermore, he reacts typically to the turning tests. The time of nystagmus was evidently normal as nearly as could be estimated, taking into account of course his spontaneous nystagmus.

His medical examination showed no abnormalities.

Laboratory findings: Wassermann negative. Blood count negative. Urine examination negative.

Here again it is felt that this man's vertigo, in view of other negative findings, is due to a vestibular irritation of nicotine origin. This probably accounts for his nystagmus. The involvement is early because the nerve pathways as shown by the hearing and vestibular tests are intact. This fact is further emphasized by the patient's practically complete relief since he has discontinued the use of chewing tobacco.

Diagnosis: Bilateral neuritis, vestibular branch of the eighth nerve, of nicotine origin, early stage.

Case 6: History: The patient's chief complaint in contra-distinction to the preceding case was that of deafness and tinnitus. He had an attack of acute otitis media two years ago in the right ear. The ear discharged for two weeks, but has never run since that time. He states that he has never had a discharging ear before or since. His past medical history gives nothing of value except that he has been a prolific chewer of tobacco for the past twenty-five years.

Physical findings: Male, age 48 years, white.

Eyes: The patient has emmetropic eyes. He has a presbyopia, properly corrected by glasses. Slight spontaneous nystagmus, lateral with a tendency to be rotary, and labyrinthine in type was present. All other eye findings are negative.

Nose: Other than a moderately deflected septum, the findings are wholly negative.

Throat: The patient has chronically diseased atrophic tonsils. Other findings are negative.

Ears: Canals negative. Both drums are of fair color and moderately retracted. The right is slightly scarred. The hearing tests follow:

Whispered voice, right, 2 in.; left, loud only. C (tuning fork), right, 0/8; left, 0/8. C_1, right, 1/12; left, 0/12. C_2, right, 2/24;

left, 1/24. C_8, right, 2/36; left, 2/36. C_4, right, 0/48; left, 0/48. Weber unsatisfactory. Bone conduction, right, minus 12 sec.; left. minus 12 sec.

Here again the caloric reactions are of extreme interest. There was slight swaying and increased nystagmus after irrigating each ear for 5 minutes with the head erect. There was no well defined past pointing. Vertigo was not well defined.

Turning tests: Head 30° forward. Ten turns right in 20 seconds. Nystagmus duration 15 seconds before returning to what may be called normal. Ten turns left in 20 seconds. Nystagmus duration 10 seconds before returning to what might be called normal. Ten turns right in 10 seconds. Did not past point. Ten turns left in 10 seconds. Past pointed once. Head 120° forward. Five turns right in 10 seconds. Fell right. Five turns left in 10 seconds. Fell left.

The hearing in the left ear is slightly more impaired than in the right. Furthermore, when turned to the right, and this affects the left ear more than the right, he did not past point.

Laboratory findings: Blood Wassermann negative. Spinal fluid Wassermann negative and cell count 2 per c. m.m., lymphocytes. The fluid was clear and there was no increase in pressure. Urine examination negative. Blood count not reported.

It is interesting to note that he is more deaf in the left ear than in the right, although the right was the one in which he had an attack of otitis media. Furthermore his deafness is out of all proportion to any demonstrable middle ear pathology.

The short duration of nystagmus and the practically absent past pointing in the turning tests bear out the caloric reactions. Furthermore, the spontaneous nystagmus suggests vestibular irritation. Moreover, his vertigo was not marked after the turning and was of very short duration. Hence, the vestibular apparatus seems to be decidedly involved as well as the cochlear.

Having found the labyrinthine involvement on each side, the man was questioned as to dizzy spells. He admitted that he did have occasional attacks of dizziness, particularly with a sudden change of position of the head. Here, too, the muscle sense seems to have very well compensated for bilateral impairment of the kinetic-static labyrinth as it has in Case 1.

Diagnosis: Bilateral neuritis of the eighth nerve, both vestibular and cochlear, of nicotine origin.

Case 7: History: The patient's chief complaint was that of deafness. He had had an acute otitis media in the left ear some thirty-

eight years ago. This lasted only a few days. The ear has never discharged since. He chews tobacco four or five times a day and has done so for a great many years. He smokes a pipe about six times a day. First noticed trouble with his hearing about eight years ago. It has gotten worse lately. He never has had any dizzy spells and his past medical history gives nothing of value.

Physical findings: Male, white, age 64 years.

Eyes: Has a moderate refractive error and a presbyopia. Both of these have been properly corrected since coming under observation. Otherwise the eye findings are wholly negative.

Nose: No findings of importance.

Throat: Very small atrophic tonsils. Otherwise findings are negative.

Ears: The canals and drums show no gross pathology. The hearing tests follow: Whispered voice, right, 4 feet; left, 2 feet; C (tuning fork), right, 0/8; left, 0/8; C_1, right, 1/12; left, 1/12. C_2, right, 3/24; left, 3/24. C_3, right, 18/36; left, 12/36. C_4, right, 6/48; left, 4/48. Weber not referred. Bone conduction, right, minus 10 sec.; left, minus 12 sec.

Caloric reactions: With the head upright, nystagmus occurred in three minutes when the right ear was irrigated, and five minutes when the left ear was irrigated. The vertigo was transitory and therefore the past pointing was not well defined. With the head back, nystagmus occurred in two minutes and forty seconds right, and four minutes left. Here again the vertigo was of short duration. On standing him up after the irrigation, he swayed but did not fall.

Turning tests: These bear out the caloric reactions. Head 30° forward. Ten turns right in 20 seconds. Nystagmus, duration 5 seconds. Ten turns left in 20 seconds. Nystagmus, duration 10 seconds. Ten turns right in 10 seconds. Past pointed only twice. Ten turns left in 10 seconds. Past pointed once with each arm Not marked either side. Head 120° forward. Five turns right in 10 seconds. Sways a little. No definite falling. Five turns left in 10 seconds. Sways a little. No definite falling. (Note) Vertigo of very short duration after each turning.

A medical examination disclosed nothing of value.

Laboratory findings: These are all negative and they include a negative blood Wassermann and a negative spinal fluid Wassermann.

In this case a definite involvement of both branches is shown. The hearing tests disclose a typical nerve deafness. The vestibular

tests also show a marked reduction of function. Both the caloric and turning tests bear out this statement.

Diagnosis: Bilateral neuritis of the eighth nerve, both vestibular and cochlear, of nicotine origin.

Case 8: History: This patient came in complaining of burning and smarting of the eyelids. He had chewed tobacco for forty-four years. Some dizzy spells, about twelve in number, were experienced a year ago. They were of very short duration. He has had none since. He has noticed recently, however, that his hearing is impaired. He has never had a discharging ear. The past medical history gives no information of value.

Physical finding: Male, white, age 61 years.

Eyes: He has a hyperopic astigmatism which has since been corrected with the proper glasses, together with his presbyopia. The other eye findings are negative.

Nose: No findings of importance.

Throat: Chronically diseased atrophic tonsils. Other findings negative.

Ears: Canals negative. Drums show no gross pathology. Whispered voice, right, 6 feet; left, 6 feet. C, right, 2/8; left, 2/8. C_1, right 6/12; left, 6/12. C_2, right 12/24; left, 12/24. C_3, right, 12/36; left, 12/36. C_4, right, 24/48; left, 3/48. Weber not referred. Bone conduction, right, minus 6 sec.; left, minus 6 sec.

Turning tests: Ten turns right in 20 seconds. Nystagmus, duration 20 seconds. Ten turns left in 20 seconds. Nystagmus, duration 18 seconds. Ten turns right in 10 seconds. Past points, right. Ten turns left in 10 seconds. Past points left. Head 120° forward. Five turns right in 10 seconds, sways right. Five turns left in 10 seconds, sways left.

Caloric reactions. Head 30° forward. Irrigation right ear, nystagmus occurred in 50 seconds. Irrigation left ear, nystagmus occurred in 45 seconds.

The medical examination disclosed nothing of value.

Laboratory findings: Blood count negative. Blood Wassermann negative. Spinal puncture and spinal Wassermann negative. Urine examination negative.

The vestibular tests in this case give rather paradoxical findings. The time of the after nystagmus was apparently shortened in the turning tests. However, nystagmus occurred altogether within normal time limits when the caloric test was used. If the duration of the after nystagmus in the turning tests was cut down, there would be a very noticeable lengthening of the time interval before nystag-

mus occurs in the caloric tests. This is true because in the turning test both canals are being stimulated, while in the caloric only one.

The writer believes there must have been some error in recording the time in the turning tests. Therefore he feels that the involvement in this case is primarily of the auditory branch with no demonstrable involvement of the vestibular branch.

It is felt that this auditory involvement is of nicotine origin in as much as there is no other demonstrable cause.

Diagnosis: Bilateral neuritis cochlear branch eighth nerve, of nicotine origin, late stage.

Case 9: The chief complaint in this case was that of deafness. He states that he first noticed a little impairment at about the age of 25 years. Neither ear has ever discharged. He smokes about twenty cigarettes a day and inhales all of them. He had pneumonia at the age of 15 and again at 21 years of age.

Physical findings: Male, white, age 55 years.

Eyes: Nothing of value.

Nose: Negative.

Throat: Chronically diseased atrophic tonsils.

Ears: Canals negative. Drums negative.

Whispered voice, right, loud only; left, loud only. Spoken voice, right, 2 feet; left, 2 feet. C, right, 1/8; left, 1/8. C_1, right 2/12; left, 2/12. C_2, right, 3/24; left, 3/24. C_3, right, 1/36; left, 1/36. C_4, right, 0/48; left, 0/48. Weber not referred. Bone conduction markedly diminished each ear.

Turning tests: Reacts normally in every way.

The medical examination gave no findings of importance.

Laboratory findings: Blood count negative, blood Wassermann negative. Spinal puncture and spinal Wassermann negative. Urine examination negative.

This is a classical case of auditory nerve deafness, with no demonstrable involvement of the vestibular branch. No other cause being demonstrable, it is believed that the cause is tobacco.

Diagnosis: Bilateral neuritis auditory branch of eighth nerve of nicotine origin.

Summary 1. The vestibular branch may be markedly involved with apparently little or no cochlear involvement as shown by Cases 1 and 2.

2. Vestibular irritation may occur with no gross cochlear change. This is apt to be the first sign of nerve involvement. Furthermore, irritation may occur without any impairment of nerve conduction. Cases 3, 4 and 5 illustrate these points.

3. Vestibular and cochlear involvement may occur concurrently as shown by Cases 6 and 7.

4. Cochlear involvement may be marked with no demonstrable lesion of the vestibular apparatus as shown by Cases 8 and 9.

5. Eight out of nine cases reported are in tobacco chewers. Therefore it would seem there is much more absorption from this form of the habit than in smoking.

CONCLUSION.

Cushny states that nicotine first stimulates and later paralyses the sympathetic nerve ganglia whether applied locally or injected into the circulation. He also brings out the fact that nicotine may cause medullary stimulation.

The logical point of attack then for a toxemia such as caused by excessive chewing of tobacco or smoking would seem to be the hair-cells of the organ of Corti, those of the maculae acusticae of the saccule and utricle, and those of the cristae acusticae in the ampullae of the canals. These cells connect with the ganglion of Corti, and Scarpa's ganglion, which are the peripheral ganglia of the auditory and vestibular branches respectively. Moreover, the processes of these ganglia (dendrites) connect with those of the hair-cells (axones). Therefore these ganglia could be affected by direct contiguity. They might even be affected independently, but this does seem improbable in as much as the endolymph is the most favorable medium for the absorption of a toxin, and the initial point of attack would naturally be the neuroepithelium, and then by direct extension the ganglia proper. It is true that medullary involvement may be also a factor, but this is highly improbable because no other cranial nerve involvement was demonstrated in any of the cases presented.

It is true furthermore, that occasionally one encounters a toxic lesion of the optic nerve caused by tobacco. DeSchweinitz states that he believes that he has observed a pure tobacco amblyopia. It seems, too, that in such cases the involvement is in the nerve itself. Hence, we have to consider a pure nerve involvement of the eighth nerve. Again this is highly improbable because the cochlear and vestibular branches are very intimately related before they enter the brain stem and it would be difficult to conceive of pathology involving the nerve trunk which did not involve both branches. Yet, the cases studied tend to show that one branch may be involved to more or less exclusion of the other.

It is indeed difficult to distinguish between a lesion of the end organs and of the nerve itself. The writer corresponded with

Dr. L. W. Dean relative to this point. He suggested the use of the galvanic test to make such a distinction. A letter was addressed to Dr. George W. Mackenzie asking for some reprints relative to the interpretation of the findings in this test. He replied that such were not immediately available and consequently the test was not used.

The question naturally arises, particularly in reference to Case 1, as to why vestibular involvement should be marked with little cochlear impairment. This is a very logical question in view of the hypothesis that the toxin attacks the neuroepithelium, and the peripheral ganglia. Why should it attack one group and not the other? The explanation given is that the hearing tests used are somewhat imperfect. Probably the most accurate instrument for the recording of hearing is the audiometer used in the clinic of Dr. L. W. Dean. By means of this instrument very accurate co-operation of the patient is obtained and the hearing may be graphically charted. In this way, certain imperfections of hearing may be demonstrated not observed with the ordinary tests in which there is such a large personal equation. If such a means of recording the hearing had been available, it is believed that Case 1 would have shown impairment of cochlear function not otherwise demonstrated.

It will be noted, also, that the cases showing vestibular irritation, and the word irritation is used with the meaning that there is no actual impairment of vestibular conduction, that there was in these cases too no apparent cochlear lesion. However in these cases there is an easy explanation. Nicotine in the early stages would stimulate the ganglia with a resultant vertigo. In such a stage of stimulation, there certainly would be no diminuition of hearing.

It is much more difficult to explain marked cochlear involvement without apparent disturbance of vestibular function as shown by Cases 8 and 9. The only explanation that can be offered is that the ganglion of Corti is somewhat more peripherally located than Scarpa's ganglion because the latter lies at the bottom of the internal auditory canal. This may be a factor. No other explanation can be offered by the writer. It should be noted that only in Case 1 was there marked vestibular involvement with little cochlear dysfunction.

Both ears were always more or less equally involved. This is an impressive argument for a toxemia such as an absorption of nicotine.

These cases show two things of value other than just the fact that tobacco may injure the eighth nerve. First, they show the value of routine ear examinations. The value of the vestibular tests in these

examinations is not to be discounted. They helped the writer very materially in the diagnosis of an early cerebellar tumor right, which was tentatively confirmed by Dr. Charles Frazier, of Philadelphia. He was also able to show by these tests in another recent case, that a right facial paralysis following a severe head injury, was peripheral. Vestibular conduction right was unimpaired. The seventh and eighth nerve are very intimately related in the internal auditory canal and near the brain stem. An intracranial lesion involving one would surely involve the other. A favorable prognosis was given which has since been justified by the patient's very rapid improvement.

They show in the second place, that the differential diagnosis of vertigo is really a problem of the ear man. Jones has made a splendid classification of vertigo, stating that every case may be included in one of five groups: 1, Middle ear lesions. 2, Intracranial lesions. 3, Ocular defects. 4, Cardiovascular disease. 5, Toxemia from any organ or focus.

The vestibular tests aid very materially in the proper grouping of a case. With the proper grouping, of course, comes the appropriate treatment and prognosis. Cases 3 and 5 particularly illustrate this point. A definite opinion was given following examination. The patients were instructed to discontinue to as great an extent as possible the chewing of tobacco. Within a few weeks after such advice, and the practical use of it by the patients, they had relief from their vertigo.

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Davis Hospital.

REPORT OF A CASE OF PNEUMO-MASTOID.

Dr. Louis K. Guggenheim, St. Louis.

Recurrence of inflammatory processes in the operated mastoid are not uncommon. Because of the previous exenteration and wide open antrum the extension of infection from the epipharynx to the tympanum and mastoid is easily understandable. Even in the presence of marked swelling and fluctuation in such a case, the presence of something other than an inflammatory process must be thought of, as the following case will demonstrate.

E. W., age 16 years, white, male, consulted me on June 27, 1924, because of pain in right ear. On June 23, 1924, patient had contracted a cold, which was followed the next day by pain in ear. The day before the examination the drum membrane had ruptured spontaneously.

The previous history included an O.M.P.A., right, in 1914.

Family history: mother died at 47 years of pulmonary tuberculosis. Two sisters died of the same malady.

Examination revealed the following: Drum membrane right, bulging in spite of the purulent discharge from spontaneous rupture. The left membrane was retracted. Hearing right, W.V. 12 feet, left 35 feet. Gingivitis, chronic tonsillitis, infected adenoid, purulent sinusitis (2nd series) right.

June 27, 1924: Myringotomy, right.

July 3, 1924: Myringtomy repeated.

July 8, 1924: Acute mastoid exenteration. Operation revealed a rather extensive necrosis of bone and much pus.

Thereafter patient made an uneventful recovery from the ear condition as well as from the sinusitis.

Aug. 18, 1924: Tonsillectomy and adenoidectomy. Following the tonsillectomy and adenoidectomy the patient was observed until Sept. 27, 1924, at which time he was discharged.

On Nov. 25, 1924, patient returned complaining of a cold and recurrence of ear trouble. Examination showed a negative right drum membrane, marked swelling over right mastoid, normal temperature and W.B.C., with slight tenderness on pressure over the swollen area. Distinct fluctuation was thought to have been felt. The absence of drum membrane change, the normal temperature,

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only slight tenderness on pressure made an unusual picture of recurrent mastoiditis; the swelling and "fluctuation", however, permitted of no logical alternative to surgical interference.

Under gas anesthesia an incision was made over the area of swelling. There followed a "pop" as air escaped. There was no pus nor, in fact, any sign of inflammatory change. The air cavity was found to be shut off from the antrum, the communication with which was re-established. Immediately air began to bubble in and out of the cavity in the mastoid. The re-establishing of the antral communication would probably better have been left undone but the search for the mechanism which had trapped the air in the mastoid reopened the antrum.

Conclusions: Had this case been left alone the trapped air would doubtless have been absorbed and most probably there would not have been a recurrence. With normal temperature and W.B.C., negative drum membrane, etc., in cases of apparent recurrence of mastoiditis, pneumomastoid should be kept in mind.

Concerning the mechanism at play in this case: the antrum doubtless communicated more or less freely with the mastoid cavity which had not as yet been obliterated by new bone formation.

A forceful blowing the nose probably inflated this cavity, distending the more or less elastic soft tissue covering. Evidently in the healing process there had resulted some sort of valve arrangement which did not permit the air to return from the mastoid. A careful search was made for such a valve but nothing of the kind could be found.

1000 Carleton Building.

TOTAL DESTRUCTION OF ESOPHAGUS BY NITRIC ACID.

DR. CLARENCE IDE, Long Beach, Cal.

Marian T., age 20 years, employed in a bakery, attempted suicide by ingesting nitric acid. Was attended for sixteen days by a local physician, then referred to the writer. Examination revealed that hypopharynx, palatoglossal pillars and tonsils had been corroded and were granulating. The epiglottis was ragged and granulating, vocal cords reddened, but not corroded. The left posterior naris had been burned by regurgitation of the fluid. Voice was only a whisper.

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Admitted to Good Samaritan Hospital, Los Angeles, Oct. 14, 1912. In consultation it was decided to delay somewhat in passing the esophagoscope, as it was thought that not much of the acid had passed below the fauces, and that anesthetization of the introitus of the gullet would enable the patient to swallow liquid nourishment.

Local applications consisting of I and KI in glycerin, or 25 per cent argyrol, or 10 per cent ichthyol in glycerin were made on Oct. 15 and 16, after cleansing with hydrogen peroxid.

Oct. 16, the glottis was cocainized and the patient encouraged to swallow milk. She failed. Attempt was now made to pass the esophagoscope. Failure resulting, a low tracheotomy was done under ether, and the anesthesia continued through the wound. When the bronchoscope reached the level of the heart the pericardium could be seen bulging in front of its lumen, at each pulsation of that organ. The esophagus could not be passed, so the ether was continued by insufflation through the tracheotomy tube, and a general surgeon in waiting performed a gastrostomy. Then the patient was fed while in the hospital, and self-feeding was continued after discharge.

Some months later the girl suffered a double lobar pneumonia, fell into the hands of a Christian Sciene practitioner for treatment, and died. We then obtained consent for a necropsy, finding that the esophagus had been completely destroyed, the trachea resting against the vertebral column. It was also found that the general surgeon had inadvertently performed a duodenostomy rather than a gastrostomy, which explained why the patient had always complained that all nourishment taken by the gastrostomy tube distressed her.

This is a retrospect. With the present development of endoscopy it is possible that a case of this character would be handled differently. The absence of the esophagus might be discovered at once, and the gastrostomy done sooner. However, there was only a two days delay after the case fell into our hands, during which time the rectal drip was employed to combat acidosis.

The girl did well after discharge up to the time of the pneumonia attack.

At least it can be said that the motto, *non nocere*, was adhered to and also that an immediately fatal issue was averted by a "masterly inactivity", which allowed the *vis medicatrix naturae* to heal the damage.

917 Security Bldg.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Meeting of April, 1925.

(Continued from page 734, September issue.)

One thing which Dr. Miller stresses as most desirable, namely an X-ray study of the size of the optic foramen, seems to me, except for the complete study of the case, not quite so necessary. In 1912, Dr. George E. Pfahler while taking oblique pictures of the sinuses found the optic foramen quite clearly shown on the plates, but has not seen any useful thing come from this knowledge in inflammatory conditions of the optic nerve. Should there be a growth, as in VanderHoevl's case reported in the February issue of the *American Journal of Ophthalmology*, which cannot be removed and where a decompression of the foramen was done with temporarily good results such studies have a practical purpose, but in a neuritis where the swelling will subside with the removal of the cause, but little of real value is to be gained, as a foramen which was large enough for the nerve before the inflammation will presumably be large enough for it after the swelling has subsided.

The two most frequent field changes in retrobulbar neuritis are enlargement of the blind spot and a central scotoma at first relative for colors only and later becoming absolute. This field change occurs in retrobulbar neuritis from any cause but enlargement of the blind spot is found much more frequently in sphenoidal or ethmoidal disease.

In my experience the only reliable treatment is some form of operative interference. Suction except for diagnostic purposes has been only a temporizing measure and operation was the final requirement, and in only one case, a bilateral one from ethmoid disease, has operation failed to produce a return to normal. In this case the vision of the left eye is but 5/15 with a persistent relative central scotoma, though she has been under observation and treatment for ten months.

I gravely doubt that these cases return to normal spontaneously and remain so permanently. As Dr. Miller says, the vision does fluctuate and I believe a later loss is probable unless aeration and drainage are established.

Dr. G. M. Coates has called our attention to the fact that high deviations of the septum seriously interfere with drainage of the posterior ethmoid cells in many cases and in others cause a lack of ventilation which, according to White, is all that is needed to produce optic nerve pathology. We all of us realize now-a-days that this is true and we see many cases of optic nerve blindness apparently caused by this narrowing of the superior meatus with no other pathology discoverable.

Furthermore, when we operate upon these cases and improve conditions for ventilation and drainage many of our cases recover vision. Conversely, however, the problem is different. We all of us in our nasal examinations see countless high deviations and choked superior meati without any suspicion of eye trouble. I believe that these are the cases classified by Leon White as having large optic canals where the nerve is not so easily compressible. I would like to ask Dr. Miller what he thinks about this point and why we do not have more optic nerve disease than we do considering the frequency of nasal pathological conditions.

In a case of my own recently, one of acute suppurative frontal sinusitis from out of town, the patient presented himself with evident signs of meningitis, a high cell count in the cerebral spinal fluid but no bacteria, stiff neck and Kernig's signs, Jacksonian type convulsions on the opposite side followed by some paresis of the hand and ankle. There was mental dullness and beginning papilledema. After a thorough

external cleaning out of the frontal sinus, where no erosion of the inner table was found, all symptoms cleared up except a double choked disc of 1 to 2 diopters. The ophthalmologist thinks that this denotes pressure behind the chiasm. I would like to ask Dr. Miller whether he thinks this opinion is correct or whether coincident disease of the sphenoethmoid group of cells would be likely to be a factor.

Dr. Ross Hall Skillern: The methods of involvements would appear as follows: 1. Direct extension of the infection. 2. Focal infection with production of toxins. 3. Hyperplasia.

I have seen many of these cases, and I am more convinced daily that they are caused by the toxicity, rather than by the extension of the infection. In percentages, I should say, toxicity 90 per cent, hyperplasia 9.9 per cent, and direct extension of infection .1 of 1 per cent. The old writers put direct extension 100 per cent, but they did not appreciate any other possibility. Suppose you operate and find apparently nothing, and then after a few days discover pus. This is not infection, just caused, but the old infection turned into another form of infection. The same is true of a cold in the head, the first day it is dry and then gradually it becomes moist and then purulent. If a retrobulbar condition is diagnosed, no time should be lost in operating, of course taking it for granted that a skillful man performs the operation. The more advanced the condition of optic involvement is, the longer the time it takes to recover.

Dr. Brumm: I want to thank Dr. Miller for his timely paper. This is a subject which I feel has not been presented in a clarified manner, and one which I think it not familiar to, too many rhinologists. First of all, I agree with Dr. Langdon that these cases should be operated upon immediately. First because sight is a function which is most necessary to our economy. Secondly, there is a very rapid loss of function in these cases; and thirdly, I am very dubious as to local treatment controlling these eye situations. I believe that the important factor in these cases is a mechanical one, as we remember very well the case of Slutter, where the patient's sight returned during the operation. Also the cases of Bordley, where the sight returned a few hours after operating. Like experiences in my own practice.

It seems to me that if the word optic neuritis is used in the true sense there would be round cell infiltration, influx of white cells and possibly an increase in the connected tissues which pathological picture could not clear up in a few hours time. I do believe there is a low grade hyperplastic sinusitis causing a complete blockage or pressure on the lympathic and vasculatory system of the sinuses and eye which in turn causes a pressure of the minute vessels supplying the optic nerve and other eye structures. Because of the intimacy of the canals of Harve and Volkeman with the eye lymphatics we can readily see how this condition could be brought about. There is a symptom which I used in these cases, namely optic neuritis or uveitis, associated with marked corneal and conjunctival injection. I have noticed a complete paiing to be brought about during the preparation of cocainization before I operated upon these patients or during my preliminary examination.

It is very interesting to take a 10 per cent cocain solution of 1 to 1000 adrenalin applied by cotton pledgets to the middle turbinate and meatus and having your patient wait one-half to one hour in your office and to note the marked subsidence of the ocular congestion.

This is another proof, to my mind, that we are dealing principally with a mechanical condition and that we possibly should use the word optic compression rather than the word optic neuritis.

Dr. B. H. Shuster: Dr. Skillern mentions the appearance of pus only after the operation on the sphenoid sinus. A case I had recently illustrates, I believe, the pathology which takes place in such a sinus. My case was that of a cervical adentitis and the pathology could be easily observed in the various stages. The large swelling in the neck and about the mastoid process complicated by an acute otitis media

made me very suspicious of mastoiditis with a possible perforation at the tip. I incised the swelling with the idea of doing a mastoidectomy if there were any indications present. I expected to find a great deal of free pus in the tissues of the neck. To my surprise I found the mastoid process normal in appearance and could not find any free pus after thorough search in the tissues of the neck. I merely made several incisions in the swelling, established through and through drainage, dressed it with wet dressing and waited for further development. Her symptoms of pain fever were gradually improving but very little and the dressings for the next three or four days merely showed drainage of serum. At about the fifth day the patient seemed much brighter and improved a great deal generally, the temperature having come down to normal. This time when I dressed the patient I found free pus on the dressings and the swelling down considerably. It was striking to find the transformation of serous exudate into pus to be concomittant with the improvement of the patient. It was not concealed and previously undiscovered pus because the tissues were deeply and thoroughly searched at the operation.

It appears to me that a similar state exists in the tissues of the sphenoid sinus when it is first opened and no pus obtained, but with the establishment of ventilation and drainage, improvement takes place and the previously edematous mucous membrane begins to deplete its water content and the transformation into pus. If the pus in the sinus as well as in the above case cited were due to infection at the operation, I do not believe that the improvement in the symptoms would appear together with the appearance of pus. I would rather expect aggravation of the symptoms than improvement.

Dr. Miller in closing: I am very much obliged to you, gentlemen, for your discussion.

Dr. Langdon speaks of neuritis and retrobulbar conditions. Retrobulbar is the most common. Dr. Coates spoke of choked discs. I have never been able to find the difference between papillemedia and papillomas and choked discs.

I believe that there is a mechanical factor where there is inflammation between the retina and the optic nerve.

Dr. Skillern speaks of toxicity in 90 per cent, it is the cause of all retrobulbar cases. Hyperplasia 9.9 per cent is also caused by toxicity. We have to get at these conditions quickly, because the longer they go the harder it is to get them better.

Dr. Coates asks if the high deviation of the septum is so frequent why are optic conditions not as frequent. This questions cannot be answered at the present time. In Dr. Coates' case, I would beg for a sphenoid ethmoid operation. I do not see how a frontal lobe abscess would cause that.

Dr. Langdon spoke of tonsils as a factor. I have had two cases where teeth were the cause. I have gotten away from the fact that the tonsils and sinuses are not the only etiological factors. The teeth, gall bladder and appendix may also be causative factors.

Meeting of May 5, 1925.

Paper: Report of Two Cases of Chronic Frontal Sinusitis. Dr. George L. Whelan.

DISCUSSION.

Dr. G. W. Mackenzie: I enjoyed Dr. Whelan's paper very much. I can readily see how intracranial complications can occur in the course of suppurative inflammation of the ethmoidal as well as the frontal sinuses. I have seen a few such cases in consultation and have operated a few with variable results, some successful and some not. I am pleased to note that Dr. Whelan saw fit to have a Wassermann test made in both cases. This, I think, is very important. I recall a case in which I neglected to have a Wassermann test made early in the

presence of pansinusitis on the right side, in a married man, who gave us a negative history and had three healthy children, the youngest about fifteen months old. In this case because of a very severe multiple neuritis, I operated the sinuses radically, externally and at the same time removed the tonsils. The results were not very satisfactory until a few weeks after the operation, the patient's Wassermann was found to be 4 plus. Following specific treatment for the syphilis the patient showed decided improvement, the neuritis disappeared entirely and the color of the patient improved. Four weeks after the administration of antiluetic treatment the patient had gained forty pounds in weight, so that I have come to consider that in every case of suppuration that behaves atypically, a careful search for syphilis should be made.

DR. G. L. WHELAN in closing: Post-mortem examination revealed the frontal sinuses intact, there was no evidence that the brain had been entered through operative procedures. On removing the roofs of the ethmoids pus of the same character as that found over the frontal lobes was disclosed. Frontal sinusitis would seem to be the most likely cause in this case and probably is a more common causative factor than ethmoidal involvement.

However, frontal lobe abscess following ethmoidal involvement is quite possible and does occur, as disclosed by the autopsy findings in this case.

Paper: **Sublingual Tonsillar Abscess. Lingual Quinsy.** Dr. Margaret F. Butler.

DR. HITSCHLER: I should like to ask Dr. Butler in what position her patient was sitting when she made the incision.

DR. H. COHEN: In 1917, I wrote a paper on the lingual tonsil. I only wrote this paper to emphasize the lack of examination of the base of the tongue and the lack of use of the laryngeal mirror. I have made it a routine practice to examine the base of the tongue.

All these cases of sublingual abscess show the same signs of swelling redness and fluctuation, tenderness, etc. Of course, drainage is not very favorable in these cases and so they should be followed and cared for. If we are more careful in our examination, we will find more sublingual abscesses.

DR. M. F. BUTLER in closing: The patient was sitting on a chair with the body in a forward position when the incision was made. His systemic condition was good. He worked a few days after the operation.

Dr. Cohen has been very fortunate to have had so many of these cases.

Abstract: **Agranulocytic Angina. Report of a Case with Two Attacks.** Dr. Henry S. Weider and Dr. Joseph A. Moore.

About fifteen cases of a diseased process known as agranulocytic angina have come to light within the last few years. The disease is characterized by: its occurrence in middle-aged females; ulcerative-necrotic processes of the throat and mouth, particularly the tonsils, less often the genitalia, gastrointestinal tract, and the skin; high fever; a marked leucopenia with diminution or absence of the neutrophiles; negative or indifferent bacteriologic findings; absence of the granular cells and myelocytes from the bone-marrow, and in the hitherto reported cases an invariably fatal outcome.

The authors report a case taking it to be one of this disease, and believing that it is the first on record where a patient recovered from an attack.

Abbreviated case history follows: Julia M., age 42 years, married, weight 150 pounds, was taken ill Dec. 12, 1922, with pains and soreness of the gums, temperature 99-100° F. Tonsils became covered with an exudate which resembled diphtheria, 10,000 units of diphtheria antitoxin were given; slight result. Smears showed Vincent's organisms, no diphtheria. Leucocyte count 1200, polys. 20 per cent, lymphocytes 80 per cent, reds and hemoglobin normal. Blood cultures negative, Widal negative. Whitish, tenacious exudate appeared in placques on the gums.

Ulceration of the vulva. Temperature rose to 104° F. X-rays of sinuses, teeth and chest negative, except one tooth, which seemed to be infected. This was removed under gas anesthesia. Heart and lungs negative. Liver and spleen not palpable. Exanthem. No jaundice noticeable. After fever of forty days duration with constant leucopenia and low polys the white count rose to 7000 with 60 per cent polys., at this time there was general marked improvement. The fever gradually came down, the patient got about. A blood count made several months later showed a normal white and differential count as well as red and hemoglobin.

Second attack: Dec. 21, 1924, patient exhausted and worried from attending a sick sister, was taken ill with headache and sciatic neuritis and nervousness. With sedatives and rest in bed and increased feeding, patient began to improve. There were no throat or mouth symptoms and no fever. On receiving news of the death of relative, patient became worse. Pains returned (back and leg). She also complained of pain in the jaw; a gland at the angle was found moderately enlarged. Mouth and throat were negative. On Jan. 11, 1925, temperature 100° F. Throat still negative. Jan. 12, patient felt very ill. January 13, severe headache and constant nausea. Temperature rose to 105.° Jan. 14, headache unbearable. Temperature 105° F. Slight ulcers and exudate of the right tonsil, opaque white spots on lower gum. White count 3000; 5 per cent polys.; 95 per cent lymphocytes. Cultures from the mouth and tonsils showed stayphylococci. Widal negative. Patient's temperature remained high. Mind was clear throughout. Circulation markedly affected. Jan. 15, patient died in the morning. No autopsy.

Angranulocytic angina is to be distinguished from aplastic anemia, aleukemic leukemia, monocytic angina, septic processes, leukemia under the influence of radiation treatment. The occurrence in middle-aged females; the absence of pallor, of marked anemia; no hemorrhagic tendencies, and normal platlet count speak for agranulocytic angina. Treatment has apparently been unavailing; measures which were used in our case in the first attack were used in other cases and did not prevent the fatal outcome.

Dr. Henry S. Wieder: This is a most striking condition. The fact that you make a diagnosis in one case does not guarantee that you will not miss the next one. We are all so accustomed to treating anginas of all grades of severity that run their course without complications that we rarely think it necessary to take a blood count and without that this condition can never be diagnosed.

During this patient's first attack we had no thought that we were dealing with a new syndrome or entity. The first report on this condition in the English language appeared only last year and the second report only after this patient's death. Our patient showed many of the characteristics of the disease but not in such severe form as most of the reported cases. She showed the throat symptoms in mild degree, but the typical swelling of the gland at the angle of the jaw was present and, what is more important, the absolute prostration and lack of resistance characteristic of all these cases. In fact, the condition probably starts as one of decreased resistance and vitally complicated by some form of throat infection against which there is no defense.

The most important feature of our case is the fact that she is the first case on record to recover completely from one attack despite the fact that she succumbed to a second one. That fact offers the hope that if we took blood counts on our angina cases we might discover more cases in their earliest stages and might discover some therapeutic measure capable of increasing the resistance. Since the two cases reported in the *J. A. M. A.* two cases have been reported in Toronto and one has been seen in Chester.

Dr. J. A. Moore in closing: I wish to emphasize that the most discernible cases are the typical ones. We have had experience with a good many leucocytes, but have not had experience with anything as low as this.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

May 27, 1925.

Presentation of Asch Instruments to the New York Academy of Medicine Section on Laryngology. Dr. Emil Mayer (presentation made by Dr. Julius Auerbach.

Mr. Chairman and members of the Section:

I regret that the continued illness of Dr. Emil Mayer prevents him from making personal presentation of the original instruments devised, made for and successfully used by Dr. Morris J. Asch for the operation for the cure of deviations of the nasal septum.

When Dr. Asch died in October of 1902, these instruments were given with his medical library to Dr. Mayer.

At that time the Asch operation had become the most popular method for the relief of the deformity caused by deflections of the nasal septum.

Believing that some day these instruments would have historical as well as sentimental value, Dr. Mayer had a die made of the name of "Asch" and had each instrument stamped with that name. Since then they have been continuously in Dr. Mayer's possession, so that there is no doubt of their originality. Provision was made for their eventual presentation to the New York Academy of Medicine from Dr. Mayer's estate, but, acting on the advice of colleagues to whom this intention was mentioned, Dr. Mayer decided to present them himself, asking that they be placed among the other original instruments possessed by the Academy and thus kept forever as an evidence of American ingenuity and a memento of the late Dr. Asch.

Permit me to present briefly the origin of the method and the devising of the instruments.

It occurred to Dr. Asch that the deviation of the cartilaginous septum was like that of a rubber ball and due entirely to the resiliency of the cartilage.

If either were pressed the bend would be corrected, but would spring back as soon as pressure ceased. It became necessary to overcome that resiliency and this he felt could be done by a crucial incision, bending over the flaps and keeping them thus bent until the overriding flaps were well knit. The holding of the position was accomplished by vulcanite tubes.

The incisions should be made in the same relative position and cross at as near a right angle as possible. Powerful compressors made the flaps overlie.

Dr. Asch was an accomplished draughtsman and the instrument maker readily followed the drawings.

The first cutting instrument made was made with a scissors handle and was found to be too weak in the handle. This instrument is among the perfected ones and is the only one of its kind in existence.

The completed instruments in this collection consist of separators to break up incisions, cutting instruments, rectangular and straight, right and left and the compression forceps.

I trust that you will accept these instruments and keep them as a memorial of Dr. Asch, a loyal member of this Academy, an accomplished surgeon, and who helped do his share toward the relief of suffering humanity.

Dr. Freudenthal, acting Chairman, said that he was still using one of Dr. Asch's instruments, and asked that Dr. Auerbach convey to Dr. Mayer the thanks and appreciation of the Section and wishes for his recovery.

Auto Irrigation of the Bronchus. Dr. Sidney Yankauer.

The patient, a young man in apparent good health, had suffered from lung suppuration, and after about three years of irrigation treatment had so far improved that he required now very few irrigations. Recently there was more secretion than usual and he returned for more irrigation. During this time the patient had learned to wash out his own bronchi whenever he was suffering from more secretion than usual. He would take water in his mouth, aspirate it into his lung, and then throw himself over a table and eject it.

Dr. Yankauer said it was such an unusual procedure that he thought the members would be interested to see it. The patient then demonstrated the procedure.

DISCUSSION.

DR. FREUDENTHAL said that evidently the young man had gotten his epiglottis under control and was able to raise it at will.

DR. HELLER said he had asked the young man how he had acquired this knack, and he had replied that for a long time he had been able to stick his fingers in his mouth and get down behind his epiglottis, so that as Dr. Freundenthal had remarked the patient had evidently a tremendous control over his epiglottis.

Chronic Polypoid Sinusitis in Mother and Son. Dr. Irving Wilson Voorhees.

Mrs. F. K., age 47 years, made her first visit to the Manhattan Eye, Ear and Throat Hospital on June 2, 1923. Examination disclosed complete obstruction of the nose by polypi. There was considerable headache and nasal discharge, both of which had been increasing for some months. X-ray examination by Dr. F. M. Law: "Both frontals are extremely large and deep. All sinuses show severe involvement. Diagnosis, chronic polypoid sinusitis."

On June 18, 1923, I did a partial double ethmoidectomy, but had to stop the operation because of excessive bleeding. Again on June 30 further ethmoid work was done and many polypi were removed, but with little impression upon the nasal interior. On Dec. 1, 1924, a radical Killian was performed on the *left* side, including a radical Caldwell-Luc. The sphenoid was curetted. There was much improvement in the patient's condition after this operation and she reported a return of the sense of smell, which had not been present for a long time. On Dec. 31 more polypi were removed from the *right* side, under local anesthesia in the clinic. Nothing further was done until Feb. 4, 1925, when a right Killian and ethmoid was done. The right sphenoid was also entered and curetted at this time. The patient is still in need of a radical operation on the right antrum. Recently there was a recurrence of polypi in the left nasofrontal duct region. These were curetted, and the nose is now quite free.

M. K., the son of this patient, age 20 years, first came to the Manhattan Aug. 8, 1922, showing a chronic polypoid sinusitis similar in every respect to the condition found in his mother. For something over two years he made occasional visits to the hospital, when a few polypi were removed, but nothing definite was undertaken. On Mar. 13, 1925, X-ray examination showed "Both frontals large and deep, with severe involvement. Both ethmoids are severely involved, also the left antrum. The right antrum and the sphenoids show moderate involvement only."

On Apr. 8, 1925, I did a submucous resection of the nasal septum and removed several polypi but it made no impression on the nasal obstruction. It is now planned to do an intranasal double ethmoidectomy, followed by a double radical Killian operation. Radical operations on both antra will be carried out, under local anesthesia, after the frontal condition has cleared.

These two patients are presented to this Section for their clinical interest. It seems hardly likely that heredity plays any role in such a condition, but it would be interesting to have the opinions of the gen-

tlemen present as to the probable cause of an almost identical condition in the two patients. It is generally accepted that polypi grow out from diseased bone areas and represent an attempt on the part of nature to overcome an infection of bone and periosteum. At any rate, in such cases as these, simple removal of polypi by the intranasal route is quite insufficient to effect a cure. During the operation on Mrs. K., the frontal bone was found to be considerably thinned, and when it was removed polypi projected into the wound as if under pressure. It will be interesting to see if a like condition is found when we perform the radical frontal operation on the son.

Cyst Removed from Nasal Septum. Dr. George D. Wolf.

The patient, a man age 49 years, came to the office about three months ago with the history that for the past ten years he had had difficulty in breathing through the nose; he could inspire but not expire. Examination showed a mild inflammation of the septum to the left, and a growth on its posterior margin about the size of a nut hanging down on a pedicle in the rhinopharynx. It looked like a fibroma, but after cutting the pedicle while pulling on the tumor with forceps the capsule broke and it became evident that the condition was a mucous cyst. The specimen was preserved and had a mucous membrane lining and capsule. Another interesting point in connection with the case was that the patient presented a great deal of crusts, in spite of the fact that there was no atrophy present. Examination of the urine showed 7 per cent sugar; this was taken care of and the crust formation had markedly improved.

Coin Removed from Esophagus. Dr. George D. Wolf.

The child, which was a year old, was brought by the mother on Apr. 24 for examination, with the history that for the past five weeks it had experienced great difficulty in taking soft or solid food. They had missed a dime in the house, but did not know that the child had swallowed it. The mother, however, had a faint suspicion that this was what had happened, and took the child to a man in the neighborhood who did so-called X-ray work, and he made a picture. She then took the child to an institution where they tried to get rid of the coin by pushing it down, but not succeeding, the mother took the child home again after five days.

While it was more or less obvious that the coin was in the esophagus, it was thought best to take another picture after giving the child a bismuth meal. It was then kept on plain water for 24 hours, and the next day with the aid of a Jackson anterior commissure laryngoscope the coin was removed without difficulty.

The interesting features of the case were that the child apparently had not suffered much and looked fairly comfortable, the mother practically made the diagnosis herself. The child did not suffer much from the whole performance and as soon as the coin was removed fell asleep and has been fairly well ever since.

Paper: **Intermittent Protrusion of the Right Eye.** Dr. Saul J. Selkin, New York.

(*Published in October issue of* THE LARYNGOSCOPE.)

DISCUSSION.

DR. MARK J. GOTTLIEB said he had happened to have seen a case which might be of some help. Some years ago a young lady came into the office with a protruding eye and the veins under the skin of the eyelids stood out very prominently. After quite a long examination and consultation, it was decided to do a radical Killian operation on account of some ethmoid disease that she had and feeling that by the ordinary method of operation one could not reach the cells that were either underneath the frontal sinus or in the sphenoidal fissure, and were probably the cause of the trouble. Operation under general anesthesia revealed a great deal of necrosis of the floor of the anterior cranial fossa, and after the operation the swelling went down.

DR. JOHN GUTTMAN said he understood that no diagnosis had been made on the case. Why might it not be a case of tumor of the orbit?

Judging from the X-ray pictures as described, there seem to be some changes in the base of the skull, especially in the sella turcica. A tumor in the orbit might explain the condition.

Paper: **The Significance and Prevention of Blindness Due to Intranasal Disease.** Dr. Mark J. Gottlieb.

Published in this Issue of THE LARYNGOSCOPE

Paper: **The Bronchoscopic Treatment of Lung Suppuration With Special Reference to the Post-Tonsillectomy Type.** Dr. M. C. Myerson. (*To appear in a subsequent issue of* THE LARYNGOSCOPE.)

DISCUSSION.

DR. JAMES ALEXANDER MILLER: I feel a little out of place in this company, but perhaps the point of view of an internist may be helpful. As Dr. Myerson has well brought out, co-operation between representatives of different fields of medicine is becoming more important and nowhere more so than in the field of lung abscess.

In association with Dr. Adrian V. S. Lambert, I am about to publish our experiences with one hundred cases of lung abscess treated over a period of the last three years. We believe that rest and postural drainage is the fundamental procedure. Bronchoscopy is a real help as an aid to drainage in certain cases, but eventually about 40 per cent of our cases have come to operation.

It takes a good deal of judgment to decide just when rest and postural drainage alone is not sufficient and for that purpose we have frequent consultations which bring in the bronchoscopist, the surgeon and the internist together, and if prompt drainage is not being established we recommend bronchoscopy to aid us. When this procedure has continued over a period of several weeks and the abscess is not clearing up, the case is again considered from the point of view of more radical operation. I feel a good many cases are treated by bronchoscopists too long and drift into a chronic condition which is very difficult to cure by any method of treatment.

We now never operate on acute cases but, on the other hand, we try to operate soon enough to offer a chance of cure; that is, before the wall of the abscess has become so thick that a cure by operation is impossible.

From 12 to 15 per cent of our cases were post-tonsillectomy abscesses. Too much emphasis cannot be placed upon the responsibility of the operating surgeon, both in making sure of the condition of the lungs before the tonsils are removed, and, secondly, to follow up the case long enough to make sure that an abscess is not resulting. As Dr. Myerson has well brought out, an abscess may develop anywhere from four or five days to three weeks after the tonsillectomy. Beginning symptoms are often insidious and if the surgeon has not followed up the case with the possibility of abscess in mind, the diagnosis is frequently delayed for many weeks, and as an early diagnosis is very important from the standpoint of treatment, for the earlier the treatment is begun the more likely is a successful cure.

In closing, I wish to express my appreciation of Dr. Myerson's contribution to this important subject and to urge with him that we approach the treatment of lung abscess with no prejudice in favor of any one particular method of treatment, but endeavor to study our cases individually and apply to each whatever method seems indicated. There is no class of cases in which frequent consultations between the physician, surgeon and bronchoscopist is more necessary, and personally I feel that the opportunities which I have had for such studies have been as valuable as any in my experience in the practice of medicine.

DR. HELLER said that Dr. Myerson in speaking of the etiology of this condition had brought up one important point, *i. e.*, he had bronchoscoped two to three hundred cases where more or less blood had entered the bronchial tree, and none had lung abscess. That shows that blood itself, even if it enters the lung, is not the cause of lung abscess. Hemorrhage is very common in pulmonary tuberculosis, but lung abscess is comparatively rare.

In his opinion, the condition was not due to the tonsils, and one should say post-adenectomy abscess rather than post-tonsillectomy. The majority of the men who take out the tonsils are not beginners. These abscesses have occurred with the best men in the practice of surgery, and they do the operation well, they take the tonsil out whole, not in pieces; but that is not true of the adenoids, which are taken out in pieces. First with the forceps, and then with the curette, and the nasopharynx is scraped. No one can tell how much of the adenoid comes out in the curette and how much slips down in the lung. It is easy to see how the adenoid tissue stays in the lung; it is not sterile, and it acts as a plug. Dr. Heller said he was firmly convinced that these bits of adenoids are the cause of what is called post-tonsillectomy lung abscesses, and that if the men would be more careful in doing adenectomies there would be fewer abscesses. As for himself, he is more careful in taking out the adenoids than in taking out the tonsils. If one takes out only part of the tonsil, the rest stays in place; it is adherent and can be taken out any time; but in taking out the adenoids some of it remains loose, and when the patient comes out of the anesthetic he can easily aspirate the adenoid tissue.

Dr. Myerson expressed his indebtedness to Dr. Yankauer, first, for introducing the method of treatment and the pioneer work which had stimulated himself and others in this country to carry on and study it further; and also for what he had just said in stressing the value of prophylaxis in the matter of tonsillectomy. He intended to revise his paper before publication to lay more emphasis on that phase of the subject.

Dr. Miller's remarks were valuable. All would agree with him that co-operation in the hospitals was essential to any good work. Unfortunately that is too rare; there are too few general hospitals where one sees it, but there is no question that a combination of three or four different men working in different fields and concentrating on one subject will produce better results.

The internists say that "cases cure spontaneously; why advocate bronchoscopy?" Dr. Myerson said it has been his habit to meet them half way, and to propose that they study the case closely for say six weeks and then if the patient is not progressing favorably, to turn him over to see if bronchoscopy will not do what watchful waiting has failed to accomplish; if after a fair trial bronchoscopy should fail, then pneumothorax surgery should be considered.

The location of any acute inflammatory process is very important. Dr. Miller had laid emphasis on that.

The question of the hypothesis laid down in a previous paper, concerning the presence of a pre-existing pathology in the lung which indicated an area of non-expulsion was not proven by any means, but he was now trying to prove it by some animal experiments and was not having a very easy time of it.

Dr. Myerson said he did not quite agree with Dr. Heller in regard to adenoids as the main factor in the pulmonary abscesses. It would take too long to explain his opinion in this view. The majority of adults who are operated upon under general anesthesia, however, do not have adenoids removed, yet we do hear of adults operated upon under general anesthesia having lung abscesses. That was only one argument, and there were others.

Two Molars Erupting Into Antrum. Dr. Sidney Yankauer.

The patient, a girl, age 18 years, applied last February for treatment for nose bleed. Examination showed no cause for it, excepting a small ulcer of the septum. The ulcer was cauterized, but the bleeding continued. A week later she returned complaining of pain in the region of the right upper molar. Examination showed a swelling, which was diagnosed as an ordinary gumboil. The dentist opened this, taking it for an ordinary abscess, but it evacuated a clear fluid. X-ray pictures were then taken and showed a very remarkable condition.

(Dr. Yankauer then demonstrated the X-ray pictures, showing two molar teeth in the right antrum, apparently hanging from the roof.)

Under general anesthesia, an incision was made under the lip and a large part of the antral wall was removed. The most anterior tooth was found very easily.

The mucous membrane was separated from the tooth and it was extracted without difficulty. The roots were three in number, but were short and stumpy. Then the second molar was then searched for. There was some secretion at one point of the mucous membrane and a piece of bone was protruding from a small perforation. The second molar tooth was found behind the perforation; it had not quite erupted but was contained in a cyst. The walls of the cyst were removed, and the tooth was extracted. Then a large opening was made into the nose, the wound being sewed up. After the packing was removed, there was a profuse discharge from the antrum, and this continued in spite of daily irrigations, until the antrum was washed out and injected with 1 per cent mercurochrome solution. After that the pus cleared up entirely, the antrum made a satisfactory healing, and today the patient has entirely recovered.

Dr. Yankauer said that the very interesting cases and report presented by Dr. Myerson brought up the subject of post-tonsillectomy lung abscess once more, and he wished to take this opportunity to again emphasize the importance of prophylactic treatment of lung abscess, which means that in adults tonsillectomy should never be done under general, but always under local anesthesia. It can be done without pain and almost without discomfort under local anesthesia. General anesthesia should be considered as absolutely contraindicated in tonsillectomy upon adults. It is true that cases of lung abscess do not occur very often, but it is not only the lung abscesses which come after these cases, but in addition one should consider the cases in which the patient has an aspiration pneumonia and a beginning lung abscess which gets well spontaneously, yet which keeps the patient sick for weeks. The actual percentage of lung abscesses following adult tonsillectomy under general anesthesia is difficult to estimate, for not all the cases are recognized as such, as the symptoms do not begin for ten days or two weeks afterward and are ascribed to a cold or some other cause. The patient is said to have a pneumonia, and the connection with the tonsillectomy is overlooked. It may be that the accident is not such a common one, but when one considers the severity of the disease and the awful condition of the patients, a pest to themselves and friends, who lose their positions because of the vile odor that comes from them, etc., it makes the matter a very important one.

Dr. Yankauer then said he would like to report two cases that showed the opposite point of view.

These patients were suspected to have lung abscess; one seemed such a clear case that it was operated upon by a surgeon without a preliminary diagnostic bronchoscopic examination, and the patient died. At autopsy, a foreign body was found in the lung, which was the cause of the abscess. Subsequently it was found that the patient had a slight cough, which was ascribed to the tonsils. The anesthesia irritated the foreign body and the mucosa surrounding it, and the patient developed a lung abscess.

The other case had been reported before. A patient with a clear case of post-tonsillectomy lung abscess was presented for diagnostic bronchoscopy before operation. A foreign body was found at the site of the lung abscess, and was removed, proving to be a bit of bone. The patient was asked about the origin of this foreign body, but she denied any knowledge of any accident. She was then asked about the tonsillectomy, and she stated that her nose had been operated upon at the same time. Examination of the nose showed that a portion of the lower turbinate was missing, and on looking again at the bone it proved to be the missing bit of turbinate. It was aspirated and caused the abscess which was taken for a post-tonsillectomy lung abscess.

In another case caused by tonsillectomy, a child suffered from attacks of dyspnea, which for eight weeks were diagnosed as asthma. An X-ray picture showed a foreign body in the bronchial tree, which was removed by bronchoscopy and proved to be a small piece of rubber tubing, of the size and type used for intranasal anesthesia. There seemed to be no doubt that this patient had been given intranasal anesthesia. The rubber tubing was too far down in the throat and was caught in the snare, and the patient inhaled it.

We must realize that every case of this kind should be bronchoscoped for diagnosis before it is operated upon, and this lesson should be thoroughly impressed. Most of the thoracic surgeons now recognize the importance of a bronchoscopic examination in every case of intrathoracic surgery.

As to the treatment of these cases with the bronchoscope, Dr. Myerson had been fortunate. The internists at Mount Sinai Hospital had found, as had those with whom Dr. Myerson was associated, that a large percentage of cases of lung abscess get well spontaneously, and they also realized that bronchoscopy would help them get well quicker, as Dr. Myerson had brought out. In the report made a few days before at the American Laryngological, Rhinological and Otological Society in Atlantic City by Philadelphia men working with Dr. Chevalier Jackson, they reported 25 per cent of the cases of lung abscess of less than three months duration cured with bronchoscopy; the percentage in the older cases was less. That corresponded with Dr. Myerson's statistics, as well as with Dr. Yankauer's own experience, the earlier cases can be cured with fewer treatments than those that are older and have become fibrotic. Dr. Yankauer said he was inclined to think that in cases of many years duration, where the abscess cavity is surrounded by firm fibrous tissue, bronchoscopy can never cure them but that they must be operated upon.

There is such a variety of these chronic conditions, however, that no one method of treatment will ever cure them all. Some will get well with bronchoscopy, and it is surprising how rapidly they improve under such treatment. In one instance a lung abscess of a year's duration, in which the patient had been running a temperature of 102 to 104,° by the second bronchoscopy the patient was relieved of a large amount of pus, and immediately the temperature improved; although the patient is not yet cured, the improvement is continuous. This was a case of a year's duration.

Dr. Yankauer said that in his own series of 150 cases, about 1 out of 7 were cured, and these were all old cases; about 70 per cent were so far improved that the patients were able to earn their living. A few cases died of acute exacerbation during this time, and a number were subjected to operation, of which group some were cured and others died.

The bronchoscope offers a help in these cases, and the young man who had just been presented was an instance. He had had a splendid position in a banking house, but had to leave it because his fellow workers could not endure the odor. He then took up this treatment. Although he is not yet cured, he is as nearly so as he ever will be, and is in very good condition, and is back at work.

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ORIGINAL COMMUNICATIONS.

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TUBERCULOSIS OF THE MIDDLE EAR WITH REPORT OF A CASE.*

DR. D. B. HAYDEN, Chicago, and DR. A. I. COHEN, Boston.

Tubercular involvement of the middle ear, although rather an uncommon condition, occurs with much greater frequency in children than in adults. It occurs during the advanced stages of tuberculosis, but is a comparatively rare complication of pulmonary tuberculosis in adults.

Schwabach found among 139 cases of phthisis in one hospital, 8 or 6.9 per cent, who had aural suppuration, while in another hospital out of 139 cases of tuberculosis, 11 or 7.9 per cent had aural suppuration.

Moldenhauser found that out of 294 cases, 35 complained of disturbance of hearing of one or both ears with or without purulent secretion, but in only 7 or 2.4 per cent of the cases could a diagnosis of tubercular disease of the ear be made with absolute certainty.

St. Clair Thomson found only two tubercular otitis media cases out of 700 pulmonary tubercular patients at the King Edward VII Sanatarium. The condition was painless and the discharge slight.

Logan Turner and Fraser found 5 out of 120 cases of pulmonary tuberculosis to have otitis media, and in only 1 of the 5 was there any suspicion of middle ear tuberculosis.

Carr, in 120 post-mortem examinations in children dying of tuberculosis, found middle ear and temporal bone tuberculosis in 3 cases

Price-Jones in 21 cases of tuberculosis in children examined post-mortem found 2 cases.

*From the Chicago Municipal Tuberculosis Sanitarium.

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Hill found, in 269 post-mortems in tubercular children, 15 cases of tubercular ears.

True enough, if all cases of suppurative otitis media had the discharge examined microscopically and cultured, many more cases would probably be discovered, but it must be remembered also that not every ear infection coming under observation in the course of tuberculosis is necessarily a tubercular process. The true diagnosis of tuberculosis of the middle ear is often mistaken because of the insidious onset, and because when the case presents itself the condition has usually passed from a pure tubercular process to one of a mixed infection, the symptoms of the suppurative condition masking the true nature of the initial disease.

Invasion of the middle ear by tuberculosis may be primary or secondary. The larger proportion are secondary to a tuberculous involvement elsewhere in the body, especially pulmonary. From the otologist's standpoint, it can be readily seen that the presence of a tuberculous condition of the pharyngeal adenoid may lead by continuity to an invasion of the tympanic cavity and its connecting structures. The disease may occur as a complication of pulmonary phthisis at any stage, but is most common in the advanced stages.

Primary tuberculosis of the ear is a rather rare occurrence, and its location is generally in the mastoid process. It may be the result of blood or aerial infection. It is difficult to rule out that there is not some small primary focus elsewhere in the body that has escaped the eye of the pathologist.

Certain conditions predispose to involvement of the middle ear by tuberculosis, and among these are tubercular lesion elsewhere in the body; unhealthy environment; age—children being more susceptible than adults; association with tubercular individuals; any condition lowering the resistance of the individual, such as general debilitating diseases, specific infections, etc.; and hereditary influences.

The most common channel of infection is invasion of the bacilli in air traveling up the tuba auditiva to the tympanic cavity. Other channels of infection are infection spreading from the mucosa of the tuba auditiva; infection spreading by way of lymphatics; through the blood stream; from the external ear; and extension from intracranial infection.

Tubercular involvement extending along the tuba auditiva is much more common in children than in adults, due to the fact that the tube is much shorter and wider in children.

Experiments by Young and Milligan show that smoke insufflated into the tube passes directly to the tympanic antrum. Air borne bacilli may in a similar manner be driven beyond the tympanic cavity by strong blasts of air such as is produced by sneezing and violent coughing.

The structures adjacent to the pharyngeal end of the tuba auditiva, especially the adenoids, when the seat of a tubercular infection are the frequent cause of extension to the ear.

The lymphatics over the mastoid are primarily involved together with the superior cervical chain, and infection of this group leads directly to involvement of the tympanic cavity.

Infection which arises through the blood stream from a tubercular focus anywhere in the body is very important and constitutes the large proportion of the so-called primary tubercular mastoiditis.

Tubercular infection arising from the external ear through an existing perforation has been reported, but it must be admitted that it occurs infrequently.

In patients where a tubercular intracranial infection exists, extension may take place to the inner ear by various avenues, but especially along the nerves or vessels of the meatus acousticus internus or the structures of the aquaeductus vestibuli or aquaeductus cochlearis.

Tuberculosis of the middle ear runs either an acute or chronic course. In the acute form there is rapid formation of tubercles which are deposited in large numbers throughout the tympanic cavity. Politzer has described them as pearly gray spots with sharply defined outlines and with very little surrounding inflammation, though in some cases the entire area of the membrane may assume a reddened or pinkish tint. Sometimes these gray tubercles can be seen on the membrana tympani and Milligan has been able to see them through an intact, semi-transparent membrane. These tubercles lead to multiple perforations, rapid destruction of tissue and the formation of granulomata. At the onset, tubercle bacilli are found in the discharge from the ear in fairly large numbers, but later the process becomes contaminated by septic or putrefactive organisms and no specific bacteria can be isolated.

The chronic form of the disease is by far the most common type encountered and the one that is most typical. The disease usually appears with very little in the way of subjective symptoms. The patient may complain of very slight impairment of hearing and the presence of subjective noises, but there is almost a complete absence of pain.

As in the acute form, tubercles are deposited in the tympanic cavity and on the drum membrane. These caseate early, breaking down and forming superficial ulcers which extend to the deeper part of the mucosa and to the underlying bone. Those deposited on the drum membrane produce multiple perforations which coallesce, causing rapid destruction of the membrana tympani. Blake and Buck believe that the appearance of a painless perforation in the posterior superior quadrant of the drum membrane is a characteristic symptom of beginning tuberculosis of the middle ear.

The discharge at first is slight, and is watery, cloudy or may be bloody. This may be the first thing noticed by the patient. Later, however, after there is contamination by mixed organisms, the discharge is thick and profuse, and after bone involvement has taken place, is fetid.

Granulations soon form from the lining membrane of the promontory and contiguous structures, and often encroach on the tympanic cavity. These granulations are pale, friable and edematus. They may disappear later, leaving bare tympanic walls which may be seen or felt.

Necrosis of the underlying bone occurs rather early in the disease, and is prone to be very extensive and widespread, a very characteristic feature being the formation of large sequestra. This is usually accompanied by very little pain, bone tenderness or fever. Owing to this early and extensive destruction of bone, the facial canal is quite often attacked, resulting in a facial paralysis and producing complete or partial terminal loss of function of the seventh nerve. Hence, facial paralysis coming on early in cases of discharging ear, if malignancy can be excluded, should be considered as strong evidence of a tubercular infection being present. Milligan states that in 45 per cent of cases of proven tuberculosis of the ear, facial parlaysis was present, while in non-tuberculous cases, it was not present in more than 2 per cent to 5 per cent.

The Koch bacillus appears to have a strong selective action for the stapedio vestibular articulation and the membrana cochlearis, thus invading the protecting membranes in these areas, and entering into and involving the end organs of the labyrinth, causing progressive destruction. It was found that in 33 per cent of cases of tuberculous disease of the middle ear submitting to a post-mortem examination, perforation of the fenestra vestibuli or fenestra cochleae was present. The labyrinth is also at times involved by erosions through the bony walls.

Enlargement of the lymphatic glands over the mastoid and in front of the tragus is present early in the majority of cases of tubercular middle ear disease. Later, the glands of the neck are involved. This is extremely important as an aid to diagnosis, as it is very uncommon to have glandular involvement in non-tubercular otitis media, and when present, the few glands that are enlarged exhibit symptoms of inflammation, being tender, painful, etc.

In many operated cases, after incision has been made through the periosteum, an opening is found in the cortex of the mastoid filled with cheesey material. This sinus leads into a well defined cavity in the mastoid filled with similar material.

In diagnosing tubercular involvement of the middle ear from the pathogenic form of the disease, much stress should be laid on the history of the case. The family history should be carefully considered with regard to exposure, environment and so forth, but it must be remembered that not all cases of disease of the middle ear occurring in patients exposed to or suffering from tuberculosis are tuberculous in character, nor, on the other hand, is it proof that because the tubercle bacillus is not found in the discharge that the process is not tuberculous in character. The tuberculous form of middle ear disease is always latent, and differs from the pathogenic form by its painless onset, early enlargement of the lymphatic glands, particularly those situated over the mastoid and in front of the tragus, the tendency to multiple perforations, extensive destruction of bone and early facial paralysis. In the pathogenic form, however, there is present an acute process which is usually accompanied by pain, fever, and a tendency to heal, and in which involvement of the lymphatic glands and early facial paralysis is rare.

Of course, the most important factor in diagnosis is demonstrating the tubercle bacillus in the discharge from the middle ear. This is very difficult, as the process rapidly becomes contaminated with pathogenic bacteria, and the tubercle bacillus is rarely demonstrable in the resulting thick, profuse discharge. The microscopic examination of a bit of granulation tissue or of a freshly removed gland may exhibit the bacillus or giant and epitheloid cells.

At the time of operation, the finding of large sequestra should make one suspicious. At this time scrapings should be made from the mastoid cavity for microscopic examination, culturing, and inoculation into animals.

In the acute form of the tuberculous type the course is very rapid, and is fatal as it generally occurs in patients in the last stages of pulmonary phthisis. The chronic form runs a slow, painless course.

The complications following tubercular invasion of the middle ear may be visceral or intracranial. Of the latter, which is the one we are particularly interested in, many conditions may arise, but we especially wish to mention tubercular pachymeningitis externa, tubercular thrombosis of the lateral sinus, hemorrhage from the carotid artery, tubercular labyrinthitis and tubercular meningitis. Tympanic tuberculosis rarely leads to tubercular meningitis, though such does occur, as is shown in our case.

The prognosis in tubercular middle ear disease is grave. Where there is much destruction of bone, with foul smelling discharge and facial paralysis, the risk is great and the outlook very unfavorable. Age also is a factor and the prognosis is much worse in infants and children. Advanced tuberculosis elsewhere in the body increases the gravity of the prognosis. Primary mastoiditis, if promptly operated upon and the focus eradicated before the condition becomes subacute or chronic, on the other hand, offers a more favorable prognosis. The majority of cases occur in young children, and Milligan said, "At least 40 per cent of my cases of proved tubercular infection have succumbed to the disease, some from tubercular or septic meningitis, others from pulmonary phthisis, intestinal tuberculosis, acute miliary tuberculosis and general morasmus."

General treatment must be rigidly carried out in these cases as it is as important as the local treatment. The patient should be in clean, healthy surroundings with freedom from care and strain. He should live in the open air as much as possible and should be given an abundance of good, nourishing food.

If the pulmonary condition is not advanced and the patient can be put into good condition, operation is indicated, with wide removal of diseased tissue and promotion of efficient drainage. This helps out the general condition in many cases, besides curing the local process at times. On the other hand, in cases with an advanced pulmonary phthisis, operative interference is contra-indicated. However, if retro-auricular abscess is present and there is evidence of sequestra which is interfering with drainage, operation should be performed in order to benefit the patient as much ass possible.

Of course, primary involvement of the middle ear by the tubercle bacillus calls for immediate operation and eradication of the focus of infection.

REPORT OF CASE.

History: J. M., a colored boy, aged 14, a patient of the Chicago Municipal Tuberculosis Sanitarium since Jan. 23, 1924.

Past Diseases: Had influenza about three years ago. He had spent the first six months of 1923 at the tubercular sanatarium at Wauwautosa, Wisc.

His chief and only complaint at the time of entrance to the institution was headaches. There was no cough nor expectoration, no pain nor dyspnea. Bowels were active and appetite good. His physical examination at that time disclosed a fairly well developed and nourished child with palpable glands. The thyroid was enlarged.

Ears were normal.

X-ray Examination: Jan. 24, 1924: Some infiltration of the base of the right lung, but does not reach periphery.

Mar. 2, 1923: Infiltration running upward from the hilus into the apex on both sides.

Jan. 26, 1923: Hilus is eccentuated and has a fan running upward to the apex and outward to the periphery on both sides of the chest. Thickened bronchus on the right with a few calcified glands.

Laboratory Reports: Sputum was positive for TB from Oct. 10, 1923, to Sept. 10, 1924. Wassermann tests were negative.

On Jan. 13, 1925, the patient came to the infirmary because of bilateral deafness and slight pain in the ears. His temperature the previous five days had ranged from 96.2° to 100° and pulse from 120 to 150. Examination of the ears disclosed a small mucous discharge in the right external canal with slight congestion of the tympanic membrane and a small perforation in its upper posterior quadrant. The left tympanic membrane was diffusely congested and bulging, and incision of the membrane made in the posterior inferior quadrant. Dry treatment of each ear was instituted. Both ears discharged only a moderate amount and the temperature from Jan. 16 to Feb. 20, 1925, varied from 97° to 100.4° with a pulse rate of about 100. One month after incision of the left tympanic membrane, slight pain and swelling developed in the glands of that side over the mastoid process and in front of the auricle.

On Feb. 26, 1925, the patient had a marked edema and fluctuation over the left mastoid area. The discharge from the left ear was quite scant and the fundus of the canal was contracted. Temperature was 99° and pulse 100. The leukocyte count was 14,750. Mastoid operation was advised.

The following day, under ethylene anesthesia administered by Dr. Winner, the left mastoid was opened. A marked softening of the cortex and the region of the pneumatic spaces was noted. A considerable mass of granulations was found in the tympanic antrum. Very little chiseling was necessary, the entire mastoid area being

evacuated by means of the curette. The wound was closed by Michael clips and drainage established with a small strip of iodoform gauze.

The patient made a fairly rapid recovery from the operation and at the end of the second week the post-auricular incision had closed. The left ear ceased to discharge on the fourth day after the operation.

The laboratory report of bone scrapings and granulations removed at the time of the operation was negative for tubercular bacilli, negative for streptococci, but positive for staphylococci. It must be remembered that it is extremely difficult to demonstrate the tubercle bacillus by direct smear.

On Mar. 20, 1925, the patient suddenly developed increased, severe agonizing headaches, rise of temperature and some rigidity of the muscles of the neck, giving every indication of the onset of a diffuse meningitis. A direct smear of the spinal fluid at this time was negative for tubercle bacilli. The meningeal symptoms diminished in severity on the third day after onset only to recur on the sixth day with increased intensity. The patient had a positive Kernig and Babinski, marked rigidity of the muscles of the neck, temperature ranging from 101° to 104° with pulse rate of 150. This increase of severity of the symptoms was followed by frequent convulsions with spasmodic contractions of the muscles of the back and neck. General paralysis developed followed by coma, from which the patient could not be aroused, death finally resulting on the tenth day after the onset of acute meningeal symptoms.

The autopsy performed by Dr. H. Sweaney, pathologist of the Chicago Municipal Tuberculosis Sanitarium, showed the following: The right ear had a waxy discharge. Posterior to the left ear, over the mastoid process, was a fairly well healed vertical scar 5 c.m. long, with no discharge coming from the left ear.

At the hilum of the right lung were numerous enlarged lymph glands which presented a pinkish to black surface on section. The left lung also showed enlarged lymph glands about the hilum. There was a small cavity in this lung, 4 c.m. from the apex of the lower lobe, filled with pus and several small lung stones.

The brain weighed 1450 gms. On removing the calvarium no gross abnormalities were visible. On separating the dura, the pacheonion bodies were found to be inflamed. The dura as a whole was slightly thickened and the meningeal vessels were found to be highly congested. On removing the brain, fine fibrous adhesions

between the extreme temporal pole of the temporal lobe and the underlying dura were found. The pia at this point was covered with a small amount of caseous material. The dura about the infundibulum was greatly thickened, forming a very firm bridge between the clinoid processes of the sphenoid bone. On separating the dura from the floor of the cranial cavity there was a marked erosion resulting in a worm-eaten appearance of the bone over the posterior area of the petrous portion of the left temporal bone. This continued over an area ½ c.m. deep just superior to the transverse sinus for two-thirds of the distance from the sigmoid sinus to the occipital protuberance and the eroded area was covered with a film of caseous material. On chiseling away the substance of the petrous portion of the temporal bone, the bone was found to be consumed in parts and its substance replaced by purulent and caseous material. The mastoid cells were in part destroyed and filled with similar material. The semi-circular canal fluid was coagulated and both the acoustic and vestibular portions of the eighth nerve were imbedded in pus. On the right the only gross abnormality was pus in the cavity of the middle ear.

ANATOMICAL DIAGNOSIS.

1. Caseous and calcified chronic tuberculous lymph adenitis.

2. Chronic ulcerative pulmonary tuberculosis.

3. Bilateral chronic otitis media.

4. Tuberculous osteomyelitis of temporal and occipital bones on the left involving the whole eighth nerve.

5. Tuberculous meningitis.

Bacteriology: The fluid pouring from ventricles into the cranial cavity gave streptococcus on culture. Caseous lymph glands and pus from bronchi gave streptococcus, staphylococcus and diplococcus on smear and culture. Guinea pigs injected with meningeal fluid and discharge from the left tympanic cavity and left mastoid cavity showed tubercular lesions.

This case demonstrates several important factors of a tubercular invasion of the middle ear:

1. Extreme difficulty of making a positive diagnosis by direct smear and culture due to early contamination by pathogenic bacteria.

2. Necessity of animal injections as an aid to a positive diagnosis.

3. The insidious onset with little or no pain and scanty discharge from the tympanic cavity.

4. The widespread destruction of bone without symptoms indicating the extent of this process.

5. The occurrence of the tubercular meningitis as a complication, which in this case was the cause of death.

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122 S. Michigan avenue.

CEREBELLAR ABSCESS WITH AN UNUSUAL COMPLICATION.*

Dr. Isaac H. Jones, Los Angeles, Cal.

Case report: The feature in this case is that the cerebellar abscess, found at autopsy, might have been found had it not been for the symptom of sensory aphasia. The woman, age 35 years, had had purulent otitis, right, fifteen years. June 23, 1924, fan-like pain, constant, right temporal region. Nausea and vomiting. Dr. Charles Brown, San Diego, found polyp and cholesteatoma; did radical mastoid operation; mastoid bone eburnated; cholesteatoma filled antrum and middle ear. Slight horizontal nystagmus to left for two days. Vomiting ceased; recurred, violently, in one week. Aug. 30, Dr. Brown and Dr. Burger explored temporosphenoidal lobe; negative. Ear healed. Vomiting recurred at intervals. No papilloedema until Nov. 15. At same time, sensory aphasia. Word blindness. This led Dr. Little to suggest neoplasm left temporosphenoidal; osteoplastic flap Nov. 17, by Dr. Burger, revealed nothing in this region. One week later I had the privilege of seeing the patient, in San Diego. Nose and throat negative. Right ear, mastoid cavity clean and dry. Both cochleas showed normal function, tested by audio-amplifier; amplified voice well heard, amplified whisper distinct, tones heard well throughout entire range. Caloric, right, head back (horizontal canal), in 4 seconds, horizontal nystagmus to left. Continued douching; in 21 seconds, there began to be a rotary element to the nystagmus, in both eyes. Douching continued for 4 minutes. No vertigo. No past-pointing, falling, pallor, sweat or nausea.

Wait of 15 minutes. Right ear douched again, head 30° forward (vertical canals). In 23 seconds, mixed horizontal and rotary nystagmus to left. It was soon noticed, on continued douching, that excursions of right eye became greater, until became twice as great as excursions of left eye. Douching continued 4 minutes. No vertigo; no past-pointing, falling pallor, sweat or nausea. She acted, in every way, as if she had not had any vestibular stimulation at all. The one single response was the nystagmus.

Left ear: Head back (horizontal canal). After douching 23 seconds, horizontal nystagmus to right, fair amplitude. After 15 seconds more of the douching, during which the amplitude of the

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nystagmus continued to increase, the right eye rolled slowly and deliberately to the left. At this time and on continued douching, the right eye was near inner canthus and in this position showed nystagmus to right, whereas left eye occupied approximately middle position and showed nystagmus to right. After douching 4 minutes, patient was lifted until head was 30° forward (vertical canals); rotary nystagmus to right, fair amplitude but with some irregularity in rhythm. This nystagmus ceased much sooner than normal. As in right ear, no vertigo, past-pointing, falling or any constitutional response whatever.

From the above it seemed probable that a lesion of left temporosphenoidal cortex would not produce such phenomena. Patient brought to Los Angeles. Above tests repeated. Right ear, head back, douching 3 seconds, horizontal nystagmus to left. Quick component not active. Left eye, deviated to internal canthus; right eye deviated somewhat to right. The quick component, left eye, never went beyond midline. On bringing head forward (vertical canals), mixed rotary and horizontal nystagmus to left, fair amplitude. Dr. Lyster called our attention to a sharp difference, with head in this position: there was no tendency for either eye to deviate to right.

Douche left, horizontal canal. In 8 seconds, vigorous horizontal nystagmus. The quick component never carried right eye even up to midline. On bringing head forward (vertical canals), utter cessation. Both eyes stared straight ahead without slightest movement. Concluded, no function from left vertical canals' stimulation. Head back again (left horizontal canal), prompt vigorous nystagmus. On bringing head forward again, left vertical canals produced no response. Head back again, left horizontal canal, produced good nystagmus, which lasted 4½ minutes. The nystagmus produced by left horizontal canal lasted about twice as long as ordinary normal duration; whereas left vertical canals produced no nystagmus.

Throughout, no vertigo, pallor, sweat or nausea. Patient entirely unaffected by tests.

Resume of vestibular findings: Prompt response of nystagmus, with total absence of vertigo or constitutional responses; the tendency to conjugate deviation, on stimulation of both horizontal canals; the presence of response from left vertical canals on first examination, followed at later date by absence of response; the in-co-ordination of ocular movement, which came into evidence from ear stimulation—the deviation of the left eye inward on douching right ear and the deviation of the right eye inward on douching left ear.

The sensory aphasia continued, however. When shown a cigar, she answered "of course I do not use them", but she could not name "cigar".

The following suggestions were made from the ear standpoint: The following lesions would, as it were, satisfy the findings as expressed above.

1. Abscess or tumor of cerebellum, pressing against brain-stem.
2. Upper portion of brain-stem. Here, however, one would be apt to note spontaneous nystagmus which is not present in this case.
3. If supratentorial, would appear to be deeply located and directly pressing upon upper portion of brain-stem.

It was obviously unreasonable to attempt to explain the sensory aphasia on any other basis than temporosphenoidal.

Patient suddenly died two days later, Dec. 21.

Autopsy: In the region of the left cerebral cortex, covered by the bone flap, were two small areas of necrosis extending into the subcortical white tissue. These areas apparently corresponded to the points into which the exploratory needle had entered at the operation. There had evidently been no post-operative hemorrhage. Enlargement of both lateral ventricles. Large abscess of the right cerebellar hemisphere with a pouting area of pus directly adjacent to the exenterated mastoid cavity, making it evident that there had been a direct extension through the dura at this point from the mastoid into the cerebellum. Right lateral sinus explored and found to be normal. The abscess occupied practically the entire right cerebellar hemisphere.

COMMENT.

1. Otitis media—mastoiditis—operation.
2. Extension of infection to cerebellum, ending in abscess, right cerebellar.
3. Aphasia developing rapidly about Nov. 15, perhaps due to arterial thrombosis.
4. Necropsy findings: *a,* right cerebellar abscess; *b,* small necrotic areas left temporal lobe, explained by softened brain tissues caused by thrombosis (?) and needle punctures.

1920 Wilshire boulevard.

THE CLINICAL VALUE AND DIAGNOSTIC SIGNIFICANCE OF THE NEWER TESTS FOR HEARING.*

Dr. Edmund Prince Fowler, New York City.

The clinical value and diagnostic significance of these tests are so closely related that the one includes, in great part, at least, the other. The older methods for testing the ears, *i. e.*, tuning forks, clicks ticks, whistles, etc., are still valuable and always will be if intelligently used, but are very inaccurate quantitatively. From the patient's standpoint, particularly, testing for speech is invaluable but often misleading. As a diagnostic aid, a single observation made by tuning forks is of little value unless the patient be trained and all the conditions for the test perfect. This is seldom, if ever, obtainable. Untrained ears require from five to ten tests to obtain anywhere near a true average reading. We have found that patients train very rapidly in their accuracy, but, even so, several observations are necessary. Of course, from a purely diagnostic standpoint great accuracy may not be necessary. It seems to be the general opinion that in order to draw an audiogram of the hearing some expensive audiometer is necessary. This is not so; if tuning forks are carefully calibrated and used, very efficient tracings, which differ only in unimportant details from audiometer tracings may be obtained without the aid of any electrical apparatus I have made many such measurements, but find it very laborious on account of the number of observations required and the necessity of waiting the best part of a minute for the fork to die down to minimum audibility at each trial. When the sound has passed this point, the fork has to be again set in maximum vibration, and again allowed to die down before the test can be re-applied; whereas, using my audiometer I can obtain in a few moments an accurate reading at minimum audibility for each frequency. Because this desired point may be approached from above or below, or repeated several times in almost as many seconds, much time is saved to the examiner and much temper, time, and tire to the patient.

The great diagnostic value of accurate audiographs is that they show diagrammatically a complete picture of the hearing capacity

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over the whole range of frequencies for both ears. From written data, it requires a considerable effort to properly place and correlate each detail for even one ear; for both ears, still more effott; for differences between the two ears and between subsequent tests, so much attention that it is seldom adequately done. (Slide showing the value of graphs.)

The highest and lowest tones are not only determined "as heard" but at the exact intensity at which they are heard, *i. e.*, a definite quantitive finding instead of the old qualitative one.

With the lowest forks and higher whistles it is possible to test only roughly the intensity heard, because no one has ever calibrated accurately these instruments for intensity; even the frequency calibrations of several Galton whistles proved on careful tests to be so far from those thought to exist that they were practically useless as precise measures.

From force of habit and training it is difficult to abandon the standard teaching that obstructive lesions show loss for the low frequencies and nerve lesions for the high; and whereas in general this is undoubtedly true, nevertheless we know there are frequent exceptions. A study of many graphs makes me more and more cautious in applying the old dictum.

From a physical standpoint there is every reason to believe that there can be a loss at any frequency in obstructive lesions, depending upon how these happen to affect the acoustic characteristics of the ear.

From a pathological standpoint, end-organ involvement surely can affect the low frequency areas instead of only the high tone regions of the basilar membranes.

However, as a working basis, we still interpret our hearing losses at the low and high frequencies, as has been customary; and thus we still tend to read our audiographs.

By a study of several hundred audiographs many interesting peculiarities of the abnormal human ear are apparent, and it may be that some day we shall, by persisting in our studies, learn a little more as to how the human ear senses sound.

(Here Dr. Fowler showed audiographs of all kinds of deafness, several of them showing the progress of the case over three or four years, and the sequence and degrees with which the different frequencies became affected.)

Briefly, summing up our data, we find that even in normal ears none show a straight normal line; all vary up and down; all vary with time, place, barometer, tire, noises, etc.

1. Many ears believed perfect by the patient show marked defects, especially in the frequencies not used for speech.

2. Many abnormal ears appear to be inherited and change not for years or life. Other members of the same family may have like abnormalities. Is this normal for this ear or this family?

3. The developed defects at certain frequencies, although unnoticed by the patient, may warn the examiner of impending deafness. Sufficient time has not yet elapsed for us to interpret these graphs diagnostically.

4. Returns to normal or near normal are shown with great precision.

5. Failure to return to normal is most importantly demonstrable, and treatment may be undertaken which otherwise would not have been deemed reasonable.

6. Malingering is easily detected, because no one can repeatedly sense correctly a given intensity of sound. (Wild variations point to faking.)

7. To diagnose total deafness in one ear, we may construct for a guide binaural graphs of known instances of monaural total deafness, and compare with such guiding graphs the curves obtained from suspected totally deaf ears. If they agree as to the differences in the losses as between the two ears in such patients, we may put it down as total deafness in the affected ear. (Of course such a guiding graph is obtained by charting the hearing of the good ear from the sound applied to the opposite side of the head.)

Many striking peculiarities and deductions are suggested from the graphs. Attention has been called to most of these in previous articles.

114 East Fifty-fourth Street.

LIGATION OF THE EXTERNAL CAROTID ARTERY FOR THE CONTROL OF IDIOPATHIC NASAL HEMORRHAGE.

Dr. F. T. Hyde, Port Angeles, Wash.

Ligation of the common carotid artery for the control of dangerous hemorrhage, or other serious conditions, throughout its field of distribution is not particularly rare, but in a review of the literature for the past five years, I can find no other case of necessity for ligation of the external carotid, as an emergency measure to control an idiopathic nasal hemorrhage. I use the word idiopathic advisedly in reporting this case, because neither cause nor pathology could be found for the condition.

Correspondence with the Annals of Otology, Rhinology and Laryngology, The Laryngoscope, *The Journal of the American Medical Association,* and with numerous workers in our special field, reveals no such cases.

The study of the literature on Ligation of the Common Carotid by Willard Bartlett and O. F. McKittrick, of St. Louis, reported in the Annals of Surgery, June, 1917, revealed the fact that the common carotid had been frequently tied with success, but their review cites no case of ligation of the external carotid only.

Several of the journals report tieing of this vessel to control postoperative hemorrhage, following intranasal or oral surgery, but none for simple, uncomplicated epistaxis. Nor do any of the standard works in my library mention this as a method of treatment for nose bleed. Though a *dernier ressort,* it has sometimes to be adopted, and should consequently be mentioned in textbooks of diseases of the nose and throat.

To review the anatomy of the nose before this Society would indeed be "bringing coal to New Castle," but to refreshen our minds with its blood supply may serve to point a moral as well as adorn a tale.

The blood supply comes to the superior portion of the nose from the anterior and posterior ethmoidal branches of the ophthalmic artery. To the posterior and lateral walls of the nasal fossae and to the septum from the internal maxillary, one of the terminal divisions of the external carotid. Inferiorly and anteriorly the blood supply is from the facial, also a branch of the external carotid, and from the ascending pharyngeal and palatine arteries, terminal branches from the external carotid.

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That many of you have successfully used this method for controlling this condition, I do not doubt; that many of you have reported doing it, I question, because of the difficulty of finding case reports; that you should do so I feel should be impressed upon you, that the authors of textbooks may feel constrained to mention it, and that the profession at large may realize that when necessary it is a safe, rational procedure that may in an emergency save life.

The following is a report of such a case:

The patient, Mr. A. R., is a Russian by descent, age 51 years, and for twenty years a resident of this country. He is a rancher by occupation. He lived, and fortunately still lives about twenty-five miles from Port Angeles, Wash., where I practice.

Past history: His first serious nose bleed occurred sixteen years ago, since which time he has had frequent severe nasal hemorrhages, hard to control. The attacks seem to start in the back of his head with a sense of pressure, and come forward to his nose, when bleeding begins. He denies venereal disease and states there is no history of bleeding in his family.

Present illness: One week before I saw him he had a rather severe nasal hemorrhage just after leaving Port Angeles for his home. He turned back and went to a general practitioner, who he said plugged the left side of his nose, and told him he could go home. After driving a few miles in his Ford, I think this not significant, his nose began to bleed violently and he returned to the same physician, who put more packing in his nose, causing blood to come from his left eye, and sent him home. His nose bled a little all the way home, and that evening a physician in his neighborhood was called, who took him to a small private hospital at Sequim.

I now quote the hospital records:

Oct. 11, 7:30 p. m., entered hospital. Pituitrin 1 c.c. given by hypo, with digitol MVIII and adrenalin 1:1000 spray to nose every 3 hours. Soft diet. He had a fairly restful night. Temp. 97°, pulse 96, resp. 24.

Oct. 12: Was given digitol MVIII every 4 hours. Had a comfortable day and night.

Oct. 13: At 2 p. m., severe bleeding came on again and he was given pituitrin 1 c.c. by hypo; digitol MVIII, and 1:1000 adrenalin spray to nose. He rested till 1 a. m. without bleeding, and then had another severe hemorrhage; the same treatment being used, the bleeding stopped. At 3 a. m. he was bleeding freely again, and again the same procedure was followed, with relief from bleeding until the next day.

Oct. 14: At 6 a. m. he was given digitol MVIII and at 9 a. m. ergotole MVIII. There was slight oozing during the day. At

1 a. m. his nose was sprayed with 1:1000 adrenalin. At 2 a. m. he was again bleeding freely. Pituitrin, ergotole and adrenalin were used as on previous occasions. The bleeding stopped and he rested till 7 a. m.

Oct. 15: The ergotole was continued every 4 hours and he bled no more that day.

Oct. 16: No bleeding until 6 p. m., when he had a very severe hemorrhage. Pituitrin and ergotole again used and bleeding stopped until

Oct 17: At 7 a. m., when very free hemorrhage again occurred and continued until 11 a. m., when I was called.

I saw him first at the Sequim Hospital at about noon, Oct. 17. He was a broad, stocky man, very pale, extremely nervous and with an anxious, worried expression. His pulse was 160, small and weak. His physician stated that his blood pressure was on entrance S. 200, D. 110. There was blood all over his face, the bed, and in a basin beside the bed. He was bleeding from both nostrils. After clearing the nostrils and packing tightly with adrenalin gauze for a few minutes the packing was removed and the nose was pale and dry. The right nostril showed a large spur at the junction of the triangular cartilage and vomer, about opposite the superior border of the inferior turbinate and almost touching it. The turbinate was normal in size. No other pathology in right nostril. The left nostril exhibited a large scab-covered area high up on the cartilaginous septum, and nothing else unusual.

Owing to his nervousness the postnasal space could not be seen, the pharynx was dry, though when bleeding he spat blood freely. I carefully packed both nostrils with iodoform vaselin gauze, gave 10 c.c. horse serum, ordered hemoplastin 2 c.c. every 3 hours by hypo and calcium lactate, gr. 25, every 4 hours by mouth. Discontinued the pituitrin, digitol and ergotole and waited an hour. No bleeding appearing, I went home. I had hardly reached my office when they telephoned he was again bleeding and they could not stop it. I returned to the hospital and when I got there the bleeding had stopped. The packing had been removed by the nurse, and the nose was dry. Not seeing any possible cause for the bleeding except the ulcer, I carefully cauterized that with chromic acid, packed the nose again with vaselin gauze, ordered an 1/8 grain of morphia by hypo for the man's nervousness and after waiting two hours, drove home. The patient had no more bleeding during the night. By mistake, the night nurse continued the pituitrin and ergotole.

Oct. 18: I saw him at 8 a. m., found him comfortable, no signs of bleeding, left him severely alone and went home. At 2 p. m., I was called and told that if I wanted to see my patient alive again I

had better hurry. I did, 20 miles in 30 minutes, and found the patient bleeding profusely from both nostrils and making a noise in his throat as if he were gargling. Frequently he would spit out clots of blood that would fill half a teacup. He was extremely restless, afraid he was dying and complained of a splitting pain in the top of his head.

The left posterior naris was plugged and the bleeding in the throat stopped; the left side of the nose was then plugged tightly, at which time blood filled the lacus lacrimalis of the left eye. In a few minutes he complained of blood running down his throat again, when another postnasal plug was put in the right side and the right nostril packed, stopping the bleeding. I explained the seriousness of his condition to his family and having no means of transfusion, advised ligation of the left external carotid. His wife insisted upon a consultant from Seattle, and Dr. A. T. Wanamaker was called. He could not come and sent Dr. W. R. Waltz, who fortunately was able to catch a boat at once, it was 11 p. m., and arrived at the hospital at 7 a. m.

At midnight I gave the patient a ¼ grain of morphia by hypo. I stayed in the hospital through the night, seeing the patient every half hour. He slept till 5 a. m. without bleeding. At 7 a. m., Dr. Waltz arrived, saw the patient, reviewed the case and agreed to the ligation, which was done at once.

Operation: A 2 inch incision was made on the anterior edge of the sternocleidomastoid muscle, its center being half-way between the clavicle and the angle of the jaw. The carotid sheath was quickly found and opened, and the first vessel picked up and thought to be the external carotid, was almost immediately recognized as the superior thyroid with a high origin and an anomalous course. The external carotid was found about one-half inch higher and a double ligature of No. 2 chromic catgut was thrown around it. The precedure occupied twenty-five minutes. All bleeding stopped at once and has never recurred up to the present. A careful examination of the nose and postnasal space at this time disclosed no pathology and no cause for the hemorrhage has been found.

The operative wound developed an infection. The stitches were removed on the third day and the wound irrigated daily with Dakin's solution. On the tenth day it was well and the patient discharged. Two weeks later I saw the patient in my office. He looked to be perfectly well, said he felt so and was building a house. It is now nine months since the operation and the patient continues well and has had no inconvenience from the ligation.

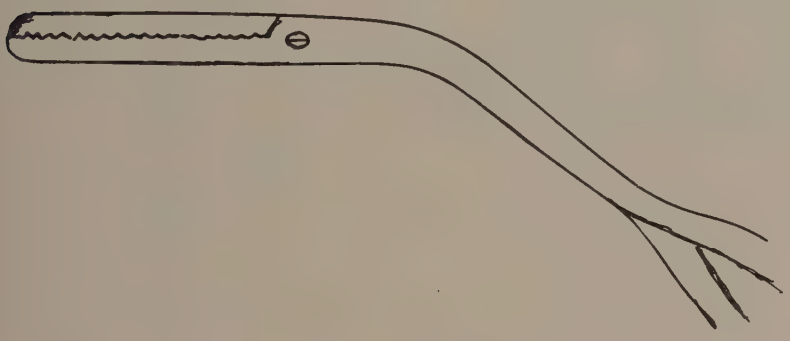
116 Laurel Street.

PARTIAL TURBINECTOMY WITH CLAMP AND CAUTERY.

Dr. M. L. Harris, Brooklyn.

There are quite a number of methods for reducing the size of an hypertrophied, obstructing inferior turbinate, and each operator has his own preference. However any method that is rapid and not followed by troublesome bleeding, to my mind, should be the method of choice. Partial turbinectomy with the clamp and cautery fulfills these requirements.

The inferior turbinate is cocainized with 10 per cent cocain. No adrenalin is used. The redundant tissue is grasped with a special



clamp modified for intranasal application, and the cautery is applied from before backwards and against the clamp until the excess tissue is burned off. Vaselined gauze strips are then placed in the nose on the eschar, removed in 48 hours and repacked until the slough falls off. A linear scar is thus left, the remaining turbinate is uninjured, and the function is not destroyed.

The clamp is 1½ inches long, 1-16th of an inch thick and 5-16th of an inch wide and serrated. It is bent to an angle so that it does not obstruct vision. An ordinary electric cautery with a flat tip is a satisfactory cautery.

1681 Union Street.

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*From the service of Dr. S. J. Kopetzky.

CHRONIC TONSILLITIS AT VARIOUS AGES

Dr. J. I. Berlin, Jersey City, N. J.

The term "chronic" is defined in Steadman's Medical Dictionary as follows: "of long standing, noting a disease of slow progress and long continuance."

While the term "chronic" as above described, may be true in many diseases, the writer believes that such a definition is misleading when we refer to the disease known as "Chronic Tonsillitis," for the reason that one is led to believe that in order to have a chronic tonsillitis, the disease must of necessity have been of long standing or of slow progress and long continuance.

Microscopic examination of a chronic inflamed tonsil reveals an increase in the lymphoid tissue, and an accumulation of connective tissue in the tonsil or stroma, which becomes fibrous in character. In many cases, an increase in the thickness of the tonsillar capsule may be seen. As a result of the above changes, the tonsil becomes large in size and either projects outward towards the median line, or upwards towards the supratonsillar fossa, or may be so buried between the faucial pillars, as to cause a bulge in the median line of the anterior pillar, as a result of the hyperplasia above mentioned.

Needless to say, such a tonsil loses its normal function and not only becomes useless but actually becomes a hindrance to the general health of the patient.

Now, how long does it take for the above pathological changes to take place?

The writer has found that it is possible for a diseased tonsil to become chronic in about a week or ten days, in instances, with a history of but one acute attack. Thus, one may have an acute attack of tonsillitis (at any age, even as young as one year), as will be shown in the table following, followed immediately by an extravasation of blood in the tonsillar stroma and a resulting increase in connective tissue leading to a fibrosis, all of which may occur within a period of one week or so.

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At the New York Post-Graduate Hospital, it is a rule that every tonsil removed be sent to the laboratory for microscopic examination. This rule is rigidly adhered to, thus enabling the writer to compile and tabulate from a series of 733 cases as follows:

Total number of cases.....733

Simple hypertrophy...607 Chronic hypertrophy...126
Divided as follows:

Age	Simple	Chronic	Per cent Chronic
1 to 3	88	4	.043
4 to 7	262	25	.087
8 to 10	101	12	.106
11 to 15	123	34	.216
16 to 19	30	10	.25
20 to 25	2	23	.92
26 to 30	1	9	.90
31 to 39	0	6	1.00
40 to 50	0	3	1.00

Note the number of chronic tonsils at an age as early as one year, with the steady increase in percentage of chronic tonsils agreeing with the increase in age.

In the above group six cases of cartilage in the capsule or at the base, was also noted.

In reviewing the pathological reports of these 733 patients whose tonsils have been removed, the writer found that the number of cases in which the pathologist reported chronic tonsils among children was surprising. A further tabulation of the above group as to sex, showed that beginning at four years and upwards, the female was the greater sufferer of chronic tonsils, while between the ages of one to three yeas the male sufferers were greater in number.

9 Gifford Avenue.

SOME FURTHER OBSERVATIONS ON SUCTION TONSILLECTOMY.

Dr. J. B. H. Waring, Blanchester, Ohio.

As several years have elapsed since suction tonsillectomy was presented to the profession, it may be in order to retrospect, as it were, and to bring out several points in passing, that have been noted in more extensive experience with the operation.

Pioneers in every branch of human endeavor have a perhaps natural way of looking on their particular method of doing a certain thing, as not only the best way, but often, as the only way. No such illusions need be entertained as to suction tonsillectomy; it not only is not the only method for surgical removal of pathological tonsils; but it is not the best. There is no one best method for all types of tonsils; and for all types of operators. For some operators, snare and dissection is the best; for others some form of Sluder operation is best; and for still others suction tonsillectomy will be found best. The personal equation enters largely into any and all surgical operations.

The operator who is satisfied with his snare and dissection results should stick to that operation; and the Sluder-type operator who finds this operation all that he desires should continue to perform this operation. For the operator, however, who is not entirely satisfied with either snare and dissection, or Sluder methods, it is believed that suction tonsillectomy presents certain obvious advantages, from the standpoint of the operator; and from the standpoint of the patient.

Suction tonsillectomy is based on sound mechanical and surgical principles; even as much so as the much discussed intracapsular cataract operation; both are very simple operations in principle; and both remarkably simple in execution, when the proper technic has been acquired; but the technic is one that requires proper equipment to begin with; and then proper use of that equipment. Some operators have attempted the operation without proper equipment, and with more or less complete disregard for the technic; and then blamed the operation for lack of success.

It is useless for an operator to use suction tonsillectomy on three or four cases; perhaps all difficult cases in a row; and expect to

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get the results that will come with a more extended experience with the method. Sluder has stated that he performed at least a thousand tonsillectomies by his highly ingenious technic before he was perfected in the operation. How, then, can any operator expect to develop a finished suction tonsillectomy technic on three or four cases; or to evaluate the operation on such a basis? One operator wrote me that he employed his customary snare and dissection on one tonsil; and suction tonsillectomy on the other. The patient complained of more pain on the suction tonsillectomy side, and he thought there was more bleeding on that side; therefore, it was thumbs down for suction tonsillectomy. Another operator wrote me that he witnessed an alleged demonstration of suction tonsillectomy technic by an aspiring young doctor in New York. His opinion was that if this was suction tonsillectomy, there must be a missing link somewhere. Several more or less prominent New York operators took part in an informal discussion of their brief experiences with suction tonsillectomy, and the dissatisfactions they encountered; clearly in each instance from an absolute disregard to proper technic. A Philadelphia operator wrote me that he had employed the operation in a few cases with brilliant results; and in others with results not so satisfactory. From this, he frankly reasoned that there must be some defect in his technic; which was correct. It is not too much to say that in the vast majority of cases, on all types of tonsils, proper suction tonsillectomy technic will yield perfect operative results. The point we would make here, however, is that the operator should not waste his time with suction tonsillectomy unless he is willing to study the technic carefully; and then to employ the operation a sufficient number of times to observe its workings on the various types of tonsils, and to perfect his operation; "get the hang of it", in other words. There is no trick, or simple twist of the wrist about suction tonsillectomy; but each case requires careful study, and careful performance of the operation step by step, if success is to be attained. Where results are not satisfactory, the operator should seek to discover the why and the wherefore. Some operators will do good work from almost their first case or two; others will require ten or fifteen or twenty or more cases before they have acquired smooth action. I do not advise any operator to attempt to demonstrate the operation to others until he is satisfied that he has perfectly demonstrated the operation to himself.

Suction tonsillectomy was developed for use with a modern electrically driven compressed air and suction pump outfit, such as is

possessed, or should be possessed, by every physician doing throat work; and it is futile to attempt to do the operation with the various hydraulic suction devices, Potain aspirators, and the like. We must have sufficient suction to completely lift the tonsil out of its fossa and hold it suspended in the bulbous tonsil suction tube mouth until our snare loop completes the "shelling out" or enucleation process proper. As a rule, from 15 to 20 inches of suction is ample for this work; but our air pump should have a little more suction power in reserve against the day when the parts become more or less worn. Proper lubrication of our air pump is an absolute necessity, if we are to secure satisfactory day-in and day-out suction service. As a rule, the light, so-called "portable", air pumps are too flimsy in construction to stand up to the heavy-duty required with suction tonsillectomy. A good air pump then is an absolute essential; and this should be equipped with pressure gauges; compression and suction regulation devices; a vacuum reservoir bottle of from one-half pint to a pint or more in capacity. While the operation can be performed without it, I regard a foot-switch for start and stoppage of our air-pump motor as worth its weight in gold to the suction tonsillectomy operator; this renders the operation truly a "one-man job"; puts our suction under the immediate control of the operator, without the intervention of any second party, nurse or assistant; and leaves both hands free for operative usage, with our eyes trained steadily on the field of operation. These motor-control foot-switches may be either electrical or mechanical in type; and applicable to practically any type of air pump on the market.

Our suction pump should be protected against suction of foreign matter (blood, pus, mucus, tonsil exudate) into the pump proper, by a vacuum reservoir bottle placed at any convenient point in the rubber tubing circuit between the tonsil suction tube and the pump; this not only protects our pump; but where operation is under general anesthesia, as in children, serves as a very convenient reservoir for any blood or mucus to be aspirated from the operative field; some air pump outfits have this as a built-in feature; and to others it has to be added.

No change has been found necessary or desirable in the tonsil suction tubes proper; but with increased study the manufacturers are furnishing a very satisfactory tube. Manufacturing rights were lodged with one company, who agreed to adhere to proper design and to submit samples of the product from time to time for

personal approval. This is the only way to insure proper type surgical instruments in any field; where every Tom, Dick and Harry of a surgical manufacture is free to put out his idea of a surgical instrument, chaos is the result insofar as uniformity and quality of instruments are concerned. Several poorly made and generally unsatisfactory imitations of this tonsil suction tube have been submitted for inspection; by purchase direct from the manufacturers, or from high class surgical distributors, the operator is assured at all times of the genuine tonsil suction tube for this operation. Suction tubes of glass have been adhered to, in preference to those of metal, which, while unbreakable, destroy the high visibility throughout the operation attained with the clear glass tube. Breakage troubles with the present tube have been practically nil, and there is no occasion for breakage with proper technic. The operation is not a strong-arm procedure, but one of delicacy and precision. Some few operators prefer to control their suction with the finger held over a hole drilled in shaft of the suction tube; but the simple slip-off connection between the suction tube and rubber tubing circuit to pump has proven so satisfactory under all conditions that the shaft hole tube is not recommended. Several operators have elaborated upon the principles of suction tonsillectomy, with more or less complicated snare-tube instruments in metal, joined together; but these add nothing to the simplicity, rapidity or efficacy of the operation; but tend to the contrary. Simplicity was the keynote in development of suction tonsillectomy technique. While the many suggestions from various operators as to improvement in tube design, technic, etc., have been gratefully received; and most carefully studied out both by the writer, and by the manufacturers; they have not as yet been found desirable of addition to the original technic. Likewise, the various difficulties found by beginners with the different stages of operation, have been given most careful study; and many personal letters have been written in explanation of the different steps in operation. Having been in a way sponsor for the operation, the writer has felt it more or less his duty to see that operators who took up the new operation, and found difficulties, real or only apparent, should be set aright.

While the operation can be performed, and is performed with practically all types of tonsil snare, it has been found that snares of the ratchet type, such as the Pierce-Mueller, Beck-Pierce, or Beck-Schenck, as it is variously called, are best adapted to this operation. Instantaneous enucleation is possible, and is largely

employed; the writer, however, prefers the slower ratchet enucleation; and to this feature lays the practically bloodless nature of his tonsil work since developing suction tonsillectomy. A few seconds saved in rapidity of enucleation is not necessarily a gain if many minutes are later used to check bleeding. The ratchet-enucleation is rapid enough to suit anyone who desires to do good, clean work.

Ether by the drop method from a Simplex anesthesia arm, has given best results, where general anesthesia is employed, as in children. Our endeavor has been to have the patient sufficiently anesthetized; and then to complete our operation, before more ether would be required to keep the patient sufficiently under; this gives us a very brief anesthesia, with none of the bother or confusion of re-application of the anesthetic from time to time to enable completion of the work.

For local anesthesia operation, which is the method of choice in all but children, we would respectfully recommend the anesthetic combination recently suggested by the writer, in an effort to combine satisfactory operative anesthesia with a more or less lasting post-operative anesthesia over the period of convalescence.

The nose and throat of the patient is first thoroughly sprayed with an anesthetic spray of 4 per cent anesthesin, combined with other mild anesthetic medicaments, such as menthol, phenol, thymol in a bland oil; this tends to markedly diminish throat sensibility, and paves the way for 5 per cent cocain surface anesthesia by swabbing; this is followed by injection about the operative field of a solution of equal parts of novocain, ½ to 1 per cent; and quinin and urea hydrochloride, ½ to 1 per cent. This solution should be freshly prepared each day; to it may be added 8 to 10 drops to the ounce of adrenalin 1-1000 solution at the pleasure of the operator. The writer does not use adrenalin, for the reason that the operative field is clear to start with; and usually remains so, with proper technic; if any bleeding is to occur in a given case, the writer would prefer to have this occur at time of operation, when all needful hemostatic apparatus was at hand; rather than have a slow oozing develop later after the constricting effect of the adrenalin has worn off of the smaller capillaries in the denuded area of tonsillar fossae. Unquestionably, the worst feature of tonsil enucleation, from the standpoint of patient, is the pain and soreness of the throat the first two or three days after enucleation. If we can in any measure diminish this suffering, it is a welcome step forward. Many operators have noted that convalescence after suction tonsillectomy is

only about half that following tonsil enucleation by the older methods; in short, the vast majority are quite comfortable and able to take nourishment easily after the first two or three days. Our novocain gives a very satisfactory operative anesthesia; and the addition of a weak quinin and urea gives a more or less complete anesthesia of the parts for four or five days after operation, without any of the deleterious effects found with quinin and urea when used in such stronger soluiton some years ago. Because of certain ill-effects when thus used, this valuable anesthetic drug fell completely into the discard for nose and throat work; and it has been with more or less temerity that the writer has ventured to remove it from the drug junkpile, and call attention to its value in tonsil work. Working independently, but along different lines, Martin, of Hot Springs, has also recognized the virtue of quinin and urea for tonsil work, when used in proper strength, and reports much satisfaction from its use, for diminution of post-operative sore throat in tonsil cases.

Returning to the operative technic proper: one of the most important features of the operation is to select the proper sized tube for the given tonsil. At the very commencement of work on a given case, the writer begins to carefully study the size of the tonsil to be attacked, so that when the enucleation stage is approached, he has obtained a quite accurate estimate of the exact size of that tonsil; and has selected the proper sized tube to employ. While apparently a very simple matter, this is a very important phase of the operation. If we employ a tube too small to completely incorporate the given tonsil in the bulbous head of the suction tube; it becomes a mechanical impossibility to completely lift that tonsil out of its fossa into the tube mouth; and when we go to enucleate, our snare loop is bound to slice the tonsil, leaving a nice stump to plague us. While this mishap with suction tonsillectomy destroys the perfect technic we would like to show the onlooking doctor, and delays us a bit, it is of minor import, and the beginner with suction tonsillectomy should not let it rattle him; but simply select the smaller sized tonsil tube and enucleate the stump, just as we would attack a tonsil stump left after some of the old tonsillotomy efforts of a decade or so ago. Where the Sluder operator has sliced a tonsil in this manner, it is almost impossible to Sluderize the slippery, flat stump; and some snare and dissection work was the only recourse, if we would leave nice, clean fossae. With suction tonsillectomy, correction of such a mishap is very simple; not that we should have such a slip in our technic; but if it does happen with the beginner, he should not feel that all is lost.

I think the tendency is for the beginner to employ too large a tube for the given tonsil; it is sometimes astonishing the size of tonsil the small and medium sized tonsil tubes will handle with proper suction. Very rarely does it become necessary to employ the largest size of tonsil tube; yet the beginner thinks he must do so; and then wonders why he takes up tonsil, pillars and all; if we find our tonsil is improperly taken up, or the pillars also taken up; it is a simple matter to release our suction grasp of the tonsil by disconnection of the rubber tubing from end of suction tube; and take up the tonsil anew; if we go ahead and bring our snare into play with the pillars also engaged in suction tube, we may or may not chew the anterior pillar up more or less in the process of enucleation; but pillar damage is absolutely unnecessary in any case; and when this occurs, is due to faulty technic. Where the pillars are close together, with small adherent or submerged tonsils, it is of much value for the beginner to employ a pillar retractor on the anterior pillar, and thus facilitate attack of the tonsil proper. The pillar retractor will rarely be found necessary, after the operator becomes at home with the technic. It is difficult to describe the exact method of tube application to each tonsil; like the art of swimming, there is a good deal of "just know-how" about it, which quickly comes with a little experience; in general, however, we carry our tube-mouth back into the pharynx under direct inspection, and hold it steady in a practically horizontal position with regard to the long axis of the body, the open tube mouth gently touching the tonsil to be enucleated; suction immediately draws the tonsil up into the tube mouth; with deeply submerged tonsils, we rather invaginate the tube-mouth between the pillars and over the tonsil, as suction is turned on; the inclined plane surfaces of the tonsil tube act very much as a double-acting wedge and push the pillars aside and away from the tonsil, which is promptly drawn out from between the pillars by suction. For the long tonsil, our tube-mouth is carried below and back of the tonsil proper; and then applied to the tonsil in an upward, forward and outward manner, almost exactly as the Sluder instrument is applied to these tonsils; this engages the lower lobe of the tonsil, and at the same time suction draws down and moulds the upper lobe, so that the entire tonsil is nicely taken up by the suction tube; some operators have imagined that on this type of tonsil, it would be necessary to remove in two or more pieces.

The operation is really at its best on badly adherent and submerged tonsils; in other words, the "hard" cases have no terrors

for proper suction tonsillectomy technic. When they encounter a badly adherent tonsil, many operators feel that they must first carefully dissect the tonsil from the pillars, before proceeding with the enucleation; if we are going to waste time with dissection work, we might just as well make it a snare and dissection operation. Careful study on this type of tonsil has shown that dissection efforts are not only unnecessary, but actually superfluous and time-consuming. On a properly engaged tonsil, our snare loop dissects the tonsil free from these adhesions faster than the eye can follow; and it is a matter of much satisfaction to the suction tonsillectomy operator to go into one of these badly adherent tonsils; and emerge a few seconds later, not only with a perfectly dissected and incapsule tonsil, but with both pillars standing out clearly and sharply, as though carved in sheer stone. In this feature of spectacularity, suction tonsillectomy shares honors with the Sluder at its best. It looks impossible; and the average beginner has an imperative urge to whip out a scalpel and dissect some, but if he will restrain this tendency, and put more study on the proper engagement of the tonsil in the suction tube, the adherent tonsil problem will no longer be a problem after a little experience with the technic.

It is true that we sometimes encounter tonsils with very dense, fibrous adhesions, where it looks impossible to get them out cleanly without some dissection—I refer to those small, flat, badly adherent and submerged tonsils where the average Sluder operator takes one regretful look; and straightway betakes himself to some form of snare and dissection attack—in short, the type of tonsil the average operator cannot "get" with the Sluder. Suction tonsillectomy technic here is identical with that on other tonsils, with the exception, that if the adhesions appear unusually dense and fibrous, it is best to allow suction to pull on the tonsil a little longer than usual, before bringing the snare into play. Under this prolonged suction, the adhesions will gradually stretch, and slowly but surely, our tonsil will be seen to be lifting out of its fossa, and into the tube-mouth. Many operators of limited experience with the technic may doubt this phenomenon; but if they will just practice upon a few tonsils of this type, they will readily see that all tonsils truly look alike to suction tonsillectomy. "Really remarkable" is the way one enthusiastic operator describes his experiences with adherent and submerged tonsils. On stumps after old tonsillotomy has been performed, these will often be found more or less submerged and bound down by dense adhesions. If attacked as above described,

they will not be found to present any undue difficulty as to clean enucleation.

Lung abscess after suction tonsillectomy has been practically unknown; this does not necessarily present conclusive proof as to the aspiratory origin of lung abscess after tonsillectomy; but taken with the fact that this complication is usually found after a general anesthesia operation, it does point out the desirability of "vacuum-cleaning" each tonsil prior to enucleation by any method. In both the Sluder, and snare and dissection operations, it is common to see considerable amounts of pus and tonsil exudate squeezed out of the tonsils in the course of operative manipulation; and under general anesthesia this highly infective material can easily be aspirated into the upper air passages; this danger has been recognized by the presentation of suction devices to place below the tonsil to collect this exudate and pus; and in one instance, by the development of a Sluder-type instrument with a sort of rubber cup attachment to collect this pus and exudate as it is squeezed out of the tonsil at operation. Suction cleansure of the tonsil prior to operation is so simple, painless, rapid and generally satisfactory, that whatever the method of tonsil enucleation employed, the writer has strongly urged that all tonsils be suction cleaned prior to operation. As a therapeutic measure on pathologic tonsils, where for any reason enucleation is refused or inadvisable, periodic suction cleansure should be given far more widespread consideration and close study, than it has to date. If there is anything to Professor Bier's hyperemic theory of treatment, its possibilities from a tonsillar standpoint should be carefully evaluated and checked up from a bacteriologic standpoint in particular.

To return to our field, however: A point where many operators fall down is that after the suction tube has been properly applied to the tonsil and we are ready for snare action, there is a tendency to pull or exert traction on the suction tube; this often has the effect of pulling the suction tube off the tonsil; or at least partly destroying our vacuum, and disengagement of a portion of the tonsil. After the suction tube has been applied to the tonsil, it should be held firmly but gently *in situ*, with no traction or manipulation of any sort thereon; the function of the suction tube is simply to lift the tonsil out of its fossa and hold it suspended in the tube-mouth, while our snare loop is carried over bulbous head of suction tube and tightened down in back of the tonsil to complete the enucleation. This done, the function of our suction tube is at an end

save as a receptacle for the enucleated tonsil, with its prior-evacuated content of pus or exudate. Again, as the snare loop is carried over the end of the suction tube and tightened down in back of the tonsil, there is a tendency to not only tighten home the snare loop, but also unconsciously to pull the entire snare towards the operator; right at the junction of the tonsil and tonsil tube, this snare pull has a tendency to slide the suction tube off the tonsil, especially if our suction is weak and the tonsil small and flat. As with the tonsil tube, absolutely no pull or traction should be made on the snare itself; instead, as the snare loop is carried over the end of tonsil tube in preparation for tightening down, the canula end carrying snare wire loop should be carried gently but firmly directly outwards behind the anterior pillar; and then the snare loop tightened down; in this manner, we avoid any traction of the snare at the tonsil-tube junction posteriorly; and have our tonsil firmly engaged internal to the snare loop, beyond any possibility of its escape prior to enucleation. With proper suction, and careful observance of these points, no difficulty will be encountered at this stage of operation.

After the tonsil is firmly engaged by the tightened down snare loop, the tonsil tube is held by the hand holding the snare, parallel to shaft of the snare; while the disengaged hand completes the ratchet enucleation of the tonsil. In this way, we use the tonsil tube as a receptacle for the enucleated tonsil; and also prevent the tonsil tube falling out of the mouth as the tonsil is enucleated, with possible breakage of tube from striking on some hard object close to operative field. In one case, the tube fell out of the mouth as the enucleated tonsil came free; and swinging in a wide arc, came up against the side of air pump cabinet; with prompt breakage of a perfectly good tube. If the tonsil tube is held as described at this stage of operation, no untoward tube damage is done, as in the instance described.

The operation is difficult in very small children; any tonsil operation is for that matter, as the operative field is so small that instrumentation is limited. With a fairly large tonsil and small throat there is hardly room for the bulbous head of even the smallest size tonsil tube in between the two tonsils; in addition to which the uvula has to be accounted for; in these cases, the smallest size tonsil tube is used, and carefully carried into the throat and gently pushed over the tonsil before suction is turned on at all; the tonsil in tube takes up hardly any more space than the tonsil did at first;

and as the structures are soft and spongy as a rule in young children, this manipulation can be accomplished without undue difficulty. After the first of such tonsils is removed, more room is made and removal of the second tonsil more easily effected. On these small children, more care has to be taken to see that the uvula is not engaged or pulled in as the snare loop is carried over the tonsil tube; otherwise, the technic is the same as with older patients.

A mouth gag is employed in the general anesthesia cases, usually one of the Denhardt type; but not employed with local anesthesia work.

It is hoped these passing remarks may be of value to those taking up the work. Some few operators have taken one fleet "theoretic" look at suction tonsillectomy, and forthwith decided it couldn't be done. Some few have attempted an operation or two; either failed to follow the technic, or attempted it without proper equipment, and failed to get results. Operators who have employed snare and dissection for years, or who have become highly efficient Sluder operators, have decided they were too old dogs to learn new tricks, and have been content to follow on their well-beaten paths.

The vast majority of operators, however, who have taken up the new operation with an earnest desire to see just what was in it, and who have realized that no matter how simple an operation is, experience is necessary to perfection in technic; have gone forward and found it good. It has naturally been most gratifying to note the many enthusiastic comments on the merits of suction tonsillectomy; and to know that one's faith in the procedure has been so fully justified. Naturally all operators have not found the operation to their liking; we could hardly expect that; but where an operator has taken up the operation with proper equipment, and with proper technic, and determination to see it through to sufficient familiarity therewith, the merits of the procedure have been clearly demonstrated. Perhaps the morrow will find all of our present-day tonsillectomy techniques relegated to the rear by newer and better methods; but and that come to pass, we can one and all take pleasure in our efforts, large and small, to build unto that perfection which must ever be the goal of the earnest worker in every field.

ANTRUM INFECTIONS AS AN ETIOLOGICAL FACTOR IN REMOTE PATHOLOGICAL CHANGES.*

Dr. F. E. V. Shore, Des Moines, Ia.

While attending Sir Morrell Mackenzie's clinic in London in 1890, I chanced to meet a doctor from Morris Manitoba, who had been under the personal observation of Sir Morrell for six months for a condition which he had finally diagnosed as sphenoid abscess, and for which he subsequently operated with a fatal termination. It is quite apparent the world's highest authority at that time was not in possession of the knowledge those of modern times would deem necessary for the correct diagnosis and treatment of nasal accessory sinus infections.

Since his time, however, each year has witnessed added knowledge of their importance, the diagnosis of pathological conditions occurring within their cavities, the transmission of these pathological changes to remote parts, and finally the successful treatment necessary for their relief.

The increased facilities of diagnosis have demonstrated extensive distribution of diseases involving these parts; and as our observation widens, we cannot refrain from shuddering at the sacrifice of human life in the recent past, as the result of our very limited knowledge of the remote diseased conditions which have had their origin in these sinuses. It is true the "flu epidemics" of 1889, 1917 and 1918 are responsible for the wide distribution of these infections, but many antedated the first flu epidemic, and many others occurring since that time are not traceable to those epidemics. It is quite probable our public swimming pools have acted largely as general distributors, as it is a matter of general observation the frequency with which infective conditions follow a plunge in some well advertised pool.

Before proceeding to a discussion of the subject under consideration, I desire to call your attention to the methods of diagnosis, and to place myself on record as to the value of each. The foremost of these measures is the X-ray, and upon its findings, the vast majority of decisions are rendered as to the presence or absence of pathological changes. As a means of determining the conditions of the

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antrum, I consider it misleading, unreliable and productive of a great wrong to the patient, in establishing a sense of security where negative findings are obtained, when none but the gravest conditions exist.

I have repeatedly proven the correctness of this statement, and have in mind one case in particular where grave complications had resulted from too great a reliance on negative antrum findings. I shall refer to this case more in detail later.

This I have not found to be the case with the frontal sinus, as I have always considered it a great aid in clearing up and confirming a diagnosis of abscesses in this region. I can hardly conceive of any operator performing an intranasal frontal sinus drainage, without first having determined the actual presence of a frontal sinus, its size, shape and relation to surrounding parts. The X-ray has demonstrated the absence of a frontal sinus in three of my patients, the absence of which was verified in one at post-mortem. It is at once apparent the incalculable damage one might inflict on a patient in efforts to enter a frontal sinus which did not exist.

Transillumination is but a minor aid and only suggestive at best. This is especially true of the antrum where I have repeatedly demonstrated the cavities clear under all shades of illumination, while they concealed half a dram of pus within their walls; others failed to illuminate, giving a positive finding owing to density of walls or floor, notwithstanding they contained nothing within.

The only reliable test for antrum infections is the irrigation of that cavity through the natural opening, and the submission of its contents to the laboratory. You can obtain more positive knowledge in 10 minutes by this means than it is possible to obtain from transillumination and skiagraph where a guess at their interpretation is all you can hope for. It is probably immaterial whether you force the antral contents out by pressure or withdraw them by suction, or as one of my conferees expressed it, "whether you are a 'blower' or a 'sucker'." However, in this class of cases I prefer being a sucker as I can entertain the mental satisfaction of knowing I am not blowing the patient's fieth to distant parts.

The admixture of blood with the antral contents as occurs when a puncture of the antrum is made, interferes with the macroscopical examination; and in those containing a small amount of discharge its presence may be overlooked.

Some three years ago while searching for the cause of an acute suppurative otitis media in a lad age 14 years, on whom a perfect tonsillectomy had been performed some years prior, I decided to

wash the antrum, and to my complete surprise obtained a dram of pus. This was done every other day for three washings with a complete cessation of the aural discharge, although no medication had been made to the ear.

I repeated the same treatment on others with similar results, so I concluded that if this were true in acute suppurative otitis media, I was dealing with the primary source of mastoid infection, and decided to put my conclusions to the test by irrigating the maxillary antrum in all cases of mastoiditis. The first case for investigation was one on whom four years prior I had performed a successful mastoid evisceration.

He now complained of right mastoid pain of increasing severity at night; mastoid tenderness on pressure and very marked deafness in each ear. He had a 2200 white blood count and the skiagraph, you will observe, shows decided mastoid changes. Each antrum contained about a dram of pus, and was irrigated daily for three weeks with normal salt solution, dried and a 2 per cent solution mercurochrome instilled. He received no other treatment, nevertheless the mastoid pain and tenderness rapidly disappeared; the hearing improved and the blood count became normal, so that at the end of four weeks I drained the right antrum, and one week later performed a similar operation on the left. Although more than two years have elapsed since the establishment of antral drainage, he has had no return of his mastoid symptoms.

A second one, whose skiagraph I present, with symptoms similar to the first, resulted in like manner—mastoid pain and tenderness permanently disappearing.

This experience encouraged me to examine the antri of all ear and mastoid infections, and especially those on whom a mastoidectomy had been performed.

One of these had had a very incomplete mastoid evisceration performed while a resident of Wisconsin. She was having pain in each mastoid with tenderness and fever. Each maxillary antrum was found filled with pus and although it was necessary to eviscerate each mastoid, it was also necessary to establish permanent drainage of the antri. She enjoys perfect health and expresses herself as having a new lease on life. I could enumerate many similar cases, but it will suffice for me to say that I have not examined a case of mastoiditis, acute suppurative otitis media, or one on whom a mastoidectomy had been performed who had not an infected antrum, and as a consequence of these observations I am convinced the antrum infections antedate those of the ear or mastoid. The frequent

recurrence of ear infections with involvement of the bone in a completely eviscerated mastoid case is thus easily accounted for.

From all that I have thus said you will observe I am relegating the tonsils to a very subordinate place. I should certainly advise the removal of pus infected tonsils and those whose presence is a nuisance and a danger, but I do not believe they are the essential sources of the remote infections for which they have been held responsible in the recent past.

Many of these antral infections are without symptoms directly referrable to the superior maxillary region, but manifest themselves in mastoid, frontal, temporal or occipital annoyances.

This was well illustrated in a case of recent date. A railroad employe had a cinder removed from his right cornea, Apr. 26, 1924. A week later he was sent to the hospital with a corneal ulcer at the point of corneal injury. He remained in the hospital twelve days, but was treated at various times for the ulcer until Sept. 26, when he consulted me. At this time he had in addition to the corneal ulcer a 70 m.m. eye pressure, and an opaque lens with vision nil. Eserine having failed to reduce the pressure, I did an iridecomy with perfectly satisfactory results; these, however, were of only three weeks duration, as he returned with a 70 m.m. pressure. I then removed the opaque lens with some loss of vitreous. Two weeks following the cataract extraction he complained of severe pain in region of left eye, for which the interne prescribed aspirin and later a hypo of morphin.

Upon examination I located the pain in the supra and infra orbital maxillary nerves with no involvement of the eye. On the following day he had a return of the pain which adhered closely to the 11 a. m. malarial type of manifestation. Notwithstanding the absence of pus in the nares, absence of darkness on transillumination or a history pointing any way to accessory sinus infection, I washed one-half a dram of pus from each antrum. He never had a recurrence of the pain. His antri were washed each alternate day and 2 per cent of mercurocrome instilled for two weeks. Congestion of the right eye continued, but was markedly lessened after each antrum treatment.

As there was considerable discharge from the antri a permanent drainage was established and one week after the last operation he returned to his home with no congestion of the right eye; normal vision left eye and but a trace of pus from left antrum. As to the part played by the sinus infections as an original factor in the infection of the corneal wound or the disturbance produced within the

eye, I am not prepared to say, but I am of the opinion they were incidental; however, I have not presented the case for a discussion of that particular phase.

The intimate relationship existing between infections of the sinuses and those of the eye have been elaborately dealt with by observers of recent times, but the antrum has not received the consideration its importance demands. Infections of the lens and sclera have not received a passing notice in their relation to antral infections. Some two years ago in a paper presented at Kansas City I advanced the theory of the bacterial origin of cataract in a large percentage of cases and observation since has confirmed that contention. A capsular cloud of variable degrees is one of daily observation and if its progress is not impeded may and does proceed to the formation of a lenticular cloud through degenerative changes of the capsular vessels. The removal of diseased tonsils, and apical abscesses will not suffice for the arrest of these process if the antri are permitted to harbor infective material of an inexhaustible amount. There are no infections of the eye that may not have their origin in the antrum and rarely, if ever, is the frontal ethmoid or sphenoid diseased without an existing infection of the antrum, which being to all intents and purposes a closed cavity situated as a terminal of the sinus sewage system, offers an inviting field for the propagation of the various species. One of the prominent symptoms of antral disease is the presence of a cough of different degrees of severity.

I recall the case of a physician's son who developed a cough, fever and sweats which caused the parents much concern least he was developing incipient tuberculosis. Physical examination and X-ray warranted the examiner in pronouncing him free from any such condition. He came to me for examination, and the presence of pus in his tonsils was readily established by slight expression. He returned for the evisceration of his tonsils, but before proceeding I decided to investigate the antri, one of which I found contained pus. A permanent drainage was established with prompt disappearance of all his untoward symptoms. He has never had his tonsils removed, is taking a college course and enjoying perfect health.

As an evidence of the extensive distribution of these infections, I shall refer to the history of a maiden lady, age 32 years, who complained to her attending physician of severe left frontal headache and a discharging left ear. At the end of two weeks' treatment the discharge ceased, but the frontal pain continued, though less severe. One week later she developed edematous left eyelids, pro-

ptosis of left eye and a recurrence of the ear discharge; she had a temperature of 104°, pulse 130, no chills, chest normal. The X-ray showed cloudy antri, cloudy left frontal, absent right frontal, slight mastoid cloudiness on each side. On the third day after the onset of these symptoms I was consulted. She had a temperature of 105°, marked left proptosis, left frontal pain, left retinitis. The preponderance of symptoms pointed to the left sphenoid as the probable source of her aggravated symptoms. I eviscerated the left ethmoid cells, opened the left frontal and sphenoid, and washed out each antrum. The cavities were all filled with pus. The operation failed to give any relief, and on the third day she died.

The post-mortem revealed a macroscopically, normal brain; no pus in left sphenoid or frontal; pus in each mastoid; each antrum; right ethmoid and sphenoid; localized infection of right pleura; and a complete absence of right frontal. The freedom from pus of the recently operated left frontal, ethmoid and sphenoid was a remarkable demonstration of the perfect drainage afforded by thorough operative interference.

I may also refer to the accuracy of the skiagraph in every detail. This is said by way of atonement for my previous remarks on X-ray.

If my observations have been correct, this was primarily a sinus infection, which if properly drained at an early stage, in all probability patient would have recovered.

There is one type of general infection where teeth and tonsils have been removed in startling numbers in attempts at locating its cause, but in the vast majority of cases the results have been disappointing, and the rheumatic patient is once more subjected to sweats and salicylate treatments.

Four years ago I had a 15-year-old patient with acute articular rheumatism, the bacterial origin of which I was determined to chase to its lair. I had his teeth, sinuses and mastoids X-rayed with negative results, and an examination of the nares revealed nothing out of the normal. A recurrence of the acute symptoms called for another X-ray of the teeth, and a filling was believed to be a possible cause; the filling was removed, followed by decided amelioration of the symptoms, only to reappear with the introduction of a temporary filling. From this it was quite apparent the tooth was the long sought offender, and it was extracted, but in place of the expected improvement, the rheumatic conditions grew gradually worse and developed an acute nephritis, with a very high blood pressure and almost complete urinary suppression. By the use of hot packs and

salicylates the grave symptoms quieted down and in due time he was able to take a drive, but the ablumin and casts remained, and the rheumatic condition was settling back for a steady grind.

Despite the X-ray finding and the negative findings in the nose I decided to irrigate the antri and found them full of pus. Improvement rapidly followed the daily douching and mercurocrome instillation in the antri, and ere long the casts and albumin disappeared from the urine. When the more acute symptoms subsided I established permanent drainage for each antri, with the complete disappearance of all rheumatic disturbances. Although three and one-half years have elapsed, he has had no recurrence of albumin, casts or rheumatism.

Frequently the rheumatic infection involves all the sinuses and the drainage of each becomes necessary before recovery can be hoped for. One such case was that of a young lady whose antrum I had washed one year prior, and at that time had advised permanent drainage. On this occasion she had been in the hospital three weeks with acute inflammatory rheumatism involving many of her joints. The Roentgenist was so positive of negative antri findings that a washing of each was necessary to convince him of the presence of a very serious infection of those cavities. Her antri were washed and treated daily in the usual manner until all acute symptoms had subsided when drainage of the antri was established, and later all the sinuses opened and drained. Rheumatic pains continued for some time, but eventually they all disappeared, and she recovered without cardiac or renal complications which so often bear evidences of the ravages of an unbridled bacterium.

I have one more citation to make before quitting this all important subject. It is that of a man, age 26 years, who consulted me for subacute attacks of rheumatism in knees, elbows and wrists. He had an extensive infection of all the left sinuses. I drained them all with complete disappearance of the rheumatic symptoms. For some unaccountable reason bony fibrous deposit closed the antral opening three times and each time the drainage was arrested. The rheumatic symptoms returned. I finally succeeded in making the drainage permanent and the patient has enjoyed entire relief.

I am thoroughly convinced more extended observation will corroborate these findings, and I cannot believe any internist is justified in feeding his patient salicylates and weakening him with sweats until the condition of the nasal accessory sinuses has been determined and their pathology corrected.

501 I. Nat. Bldg.

PSYCHOSIS RESULTING FROM TOXINS OF CHRONIC MAXILLARY SINUSITIS, COUPLED WITH LEFT HYPERPHONIA OF 8½ PER CENT.

Dr. Clarence Ide, Long Beach, Cal.

Mrs. Elsa M., German descent, age 34 years, referred by her husband, a surgeon, had suffered for some time with a psychosis, which had demanded confinement to a sanitarium for some months. In addition there was complaint of severe recurrent headaches, with the pains over the vertex which we consider characteristic of sinusitis, as well as profuse purulent secretion from the nares. The skull and teeth had been radiographed and thorough physical examinations had failed to reveal the cause of the mental aberration, as reported by her medical attendant. This physician, who was present when the writer operated, remarked, I always felt sure the cause of the psychosis existed above her neck. The first examination, Mar. 5, 1920, showed the following: septum not deflected, middle turbinals not massive (free space between middle turbinals and lateral walls, no contact with septum). Pus in right superior meatus. Mucous membrane glazed.

On transillumination the left pupil and semilune were dark. The right less so, but not clear. The voice has a typical nasal twang.

Radiographs showed the maxillary sinuses cloudy.

Advised puncture and irrigation of maxillary sinuses for diagnosis. Washing of right antrum produced no discharge, but the flow of the fluid (from Yankauer wash bottle) was blocked as by thickened membrane or polypoid condition. Irrigation of the left antrum produced thick, ancient pus. This procedure was followed by pain in the teeth, eyes and head. Treatment by ichthyol packs, 50 per cent argyrol to antra.

Mar. 8, 1920: Irrigation repeated. No secretion from right side. From left argyrol stained mucopus. Ichthyol pack. Argyrol to antra. Pain down the neck followed this treatment.

Mar. 12: Did bilateral Canfield operation under ether. Antra curetted and packed with gauze.

Mar. 13: Removed small amount packing from right side. There was ecchymosis below inner canthus of O. D.

Mar. 14, 17, 22 and 24: Irrigated. Small amount of discharge.

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Mar. 26: Punched out edge of wall between antrum and naris to enlarge opening on left side.

Mar. 30, Apr. 2: Dichlorazene to both antra. There had been slight accession of discharge.

June 12: Reports three headaches since operation (three months) always caused by sexual intercourse. Gave belladonna for spastic constipation, also thyroid extract, ovarian extract, and pituary extract to combat endocrine imbalance.

On May 26th at refraction for glasses, the lids showed slight folliculitis, the pupils reacted to light and distance, the consensual pupillary reaction was positive.

The ophthalmoscope revealed pigmented areas, a scleral stretching at temporal border of each papilla.

Patient reported paralysis of accommodation as sequel to diphtheria in childhood.

Homatropine cycloplegia. Retinoscopy.

Accepted: O.D. + .75 with + 1.50 at 180, O.S. + 1 with + .50 at 180.

Prism O.D. 3° base up, O.S., 3° base down.

Muscles: Dist. Ex. ½°, L.H. 7½°; Near Ex. 11°, L.H. 8½°.

Extorsion O.D., 3°.

Parallax Test + dist. and near; cover test shows vertical recovery of O.S.

For reading a grab front was prescribed with prism 4° base in O.U. Whatever may be the opinion of some of the neurologists, I feel confident that this susceptible woman had suffered her psychosis from absorption of toxins from her maxillary sinuses with, in addition the unrelieved strain resulting from 8½° of vertical ocular muscle imbalance. The operation, prescription of proper lenses, and organotherapy brought relief. The patient was cheerful and bright, and confided to me that any suffering she had experienced since the operation was brought on by sexual intercourse, which she dreaded.

This patient had a brother who was mentally deficient, so heredity had its part in the causation of the psychosis.

917 Security Building.

A REPORT OF TWO CASES OF CHRONIC FRONTAL SINUSITIS.*

Dr. George L. Whelan, Philadelphia, Pa.

The unusual symptoms and sequelae of two cases in which the frontal sinuses were involved justify the presentation of this report.

The etiological factors concerned in infection in the sinuses are the same as those in other parts of the body. In a general way it may be said that what applies to one sinus is applicable to all the others. However, in considering the frontal sinus we must bear in mind a number of anatomical details and relationships.

Briefly we may say that the frontal sinus is a cavity situated in the diploae of the frontal bone, surrounded by diploic veins, fed by an immensely vascular network of external vessels, and connected with the origin of the superior longitudinal sinus and the dura by emissary veins. The frontal osteum empties into the nasofrontal duct, which is a narrow canal, while the outlets of the other sinuses are situated directly in the nasal passage. The nasofrontal duct may be occluded by swelling of the anterior portion of the middle turbinate, or by a high deviation of the septum. Therefore, if we have a general inflammation of the mucosa of the frontal sinus, due to the conformation of the anatomical structures of this region, the mucosa lining this sinus is liable to become the seat of chronic infection, which would not necessarily occur under similar conditions in the other accessory cavities. It would seem that most of the frontal sinus affections arise as a result of pressure or infection from structures outside the duct.

Among the suppurative complications which may occur as the result of frontal sinus infection is frontal lobe abscess; meningitis may also occur, as well as the interesting and obscure complication of osteomyelitis, whether by the external or intranasal route. It is therefore evident that the anatomic structure and relationship are most favorable for a rapid spread of infection, and that only a lowered resistance is necessary to initiate activity.

CASE REPORTS.

Case 1: Mrs. A. T., age 60 years, colored, a cook by occupation, was referred to Dr. Ross H. Skillern's clinic, Medico Chi, on Nov. 10, 1923.

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*Read before the Philadelphia Laryngological Society, May 5, 1925.

History: At the age of 27 she was treated for what she describes as pain over right frontal region, coincident with head cold, such attacks occurring once or twice yearly, with gradually increasing frequency. Sept. 1, 1923, she developed marked swelling, pain and tenderness, with severe headache, over right eye. This condition was treated as a "brow abscess" in a Baltimore hospital. The treatment, consisting of incision and drainage over the region of inner quadrant of the upper lid, was followed by temporary relief.

Roentgenological Findings, Nov. 8: Both frontals showed haziness, indicating that they should be investigated for possible exudate. The sphenoids were clear; the ethmoids on the right side densely occluded with exudate; the maxillary sinuses opaque, particularly the left.

Blood Wassermann: Negative.

Urine Analysis: Negative.

Nov. 10: Rhinoscopic examination discloses yellowish pus filling the nasal fossae. Antral washings show fetid yellowish pus. The right frontal sinus was opened intranasally; this was followed by an increase of the discharge, though some of the pus escaped through the original incision in the eyebrow.

Nov. 22: A Caldwell-Luc operation performed on the right side was followed by some improvement in the condition of the right frontal. Lavage of left maxillary sinus shows only slight improvement with relapses.

Dec. 18: Pain persists over the left frontal region; infraction of the left middle turbinate, and introduction of a probe discloses yellowish pus. Treatment did not seem to have relieved the condition.

Jan. 9, 1924: Denker's operation performed on the left antrum was followed by cessation of left frontal symptoms, and very little discharge from the left side. From the right side of nose, however, there is still some discharge, and the fistula continues to discharge freely.

July 23: Frontal operation was decided upon, to be modified as might be indicated by the findings. The sinus was full of pus, granulation tissue and polypi. One area of granulation tissue seemed more prominent than the rest. Since, in this area, the posterior plate receded, it was carefully curetted; during this procedure there came into view a smooth round opening about the size of a 25-cent piece, in the posterior plate; the edges of this opening were formed of solid bone; the small projection, referred to above, was dura which was firmly adherent to the bony margins of the perfora-

tion. The area was protected with sponges and the operation completed.

After recovery from the operation there was only a slight discharge and, occasionally, slight headache. The cosmetic result was good. On neurological examination nothing abnormal was found, notwithstanding the hernia cerebri. Apparently the process was well walled off by nature before the operation. The prognosis is now good, since the area of exposed dura is free of pus, and sixteen months has elapsed since the last operation.

Points of interest in this case are the apparent resistance of the dura to infection and the subsidence of the left frontal infection after the Denker operation, which shows the possibility of the frontal becoming infected from the maxillary sinus. This is easily understood when one bears in mind the fact that the patient is not always in the upright position and that during sleep the frontal and maxillary sinuses are approximately on the same plane, thus making possible an extension of the infection. The frequency of this mode of extension of an infection would seem to depend entirely upon the configuration of the maxillary osteum, riatus semilunaris and frontal osteum. However, this route of infection, as described, is not the usual one, inasmuch as maxillary involvement, when it coexists with frontal infection, is usually the sequela of the latter rather than its cause.

Case 2: R. .M, a laborer, age 23 years, was referred to Dr. Ross H. Skillern's clinic, Sept. 18, 1924. He had been employed in a New Jersey lead works during a period of six months, two years ago. Since then he had been working irregularly.

There has been, for the past two years, frequent head colds accompanied by headaches. Three weeks ago the patient developed a cold, which was followed by left frontal headache. On admission there was proptosis and tenderness over the left supraorbital region.

Examination: Intranasal examination revealed a great quantity of yellowish pus coming from beneath the middle turbinate and between the middle turbinate and the septum. The right side was practically negative, excepting that the middle turbinate was boggy in appearance. Antra washings were negative.

Roentgen examination shows the left frontal sinus to be opaque, the sphenoids clear, the ethmoids on both sides occluded with exudate, and the maxillary sinuses clear.

Blood Wassermann: Negative.

Urine analysis: Negative.

Sept. 20: With the patient under cocain-adrenalin anesthesia, the left middle turbinate was removed and the left frontal sinus opened intranasally. Following this, the headaches were relieved and there was a subsidence of tenderness and swelling in the supraorbital region.

Sept. 29: Swelling about the size of a ten-cent piece was observed over the inner third of left frontal sinus, also a swelling about the size of a large bean was seen about 5 m.m. above the inner canthus of eye; both swellings were somewhat reddened and showed fluctuation, and there was marked sensitiveness in the superior internal angle of the orbit. Anterior rhinoscopy revealed an abundance of yellowish pus in the left middle meatus; the right side was practically negative. With the patient under general anesthesia, an incision was made along the left brow and the periosteum was raised in the direction of the median line. At about 1 c.m. from this line a small zone was found in which the external table of the sinus was necrotic. The pocket was opened, part of the anterior inner frontal wall was resected, and a small quantity of pus and granulation tissue were evacuated, after which the area was curetted. An incision was then made over the fluctuating area below, a small amount of pus was evacuated and free drainage was established; this incision did not join the initial incision above. A catheter was introduced into the frontal sinus and anchored with a silkworm-gut suture; it was allowed to remain for six days. The patient was discharged Oct. 6, with the condition considerably improved.

Oct. 17: The patient was readmitted with a septal abscess on the right side. A window flap was resected in the mucous membrane along the base of the quadrilateral cartilage and drainage was established. This procedure was followed by improvement. The patient asked to be discharged Oct. 20.

Oct. 21: An edematous swelling developed over right frontal region. Headaches, increasing in intensity, again occurred.

Oct. 22: The wound on left side was reopened and was found to be clean with ample drainage. An incision was made to effect communication with the edematous area over the right frontal region; this area was thoroughly inspected and drainage was established. No pus was found.

Oct. 23: Patient became lethargic and developed convulsions and Kernig's sign. Spinal puncture showed the cerebrospinal fluid to be under pressure; 25 c.c. were withdrawn. The cell count was high—372 per cubic millimeter; sugar was present; the proteins

were greatly increased; the fluid was negative for organisms. Five hours later 25 c.c. of a 1 per cent solution of mercurochrome in sterile distilled water was administered intravenously. Improvement soon followed and the next day the patient recognized his family and could take food.

Oct. 24: The results of spinal puncture were practically the same as given above. No organisms were found.

Neurological examination (Drs. Weisenberg and Patton): The symptoms are indicative of a bilateral cortical lesion, more marked on the left side. The probabilities are that the patient has a bilateral frontal lobe involvement. Taking into consideration the serology, operation is practically hopeless. Roentgenograms show no evidence of abscess about the cranial vault, no evidence of bone disease, rarefaction or absorption. There is diffuse density about the ethmoid region suggesting exudate on both sides; the mastoid processes on both sides are clear; the sphenoids in the lateral view are hazy.

Oct. 27: The patient's condition is improved, there is less difficulty in arousing him, convulsions occur only occasionally.

Oct. 28: Marked improvement continued.

Oct. 29: At 1:15 a. m. the patient requested water, which he took unaided; twenty minutes later he died.

Autopsy (by Dr. Jonas) disclosed a deeply congested and opaque dura. On incising the dura yellowish pus was seen to be diffusely distributed over the frontal lobes of the brain, and in the longitudinal sulcus. The posterior walls of frontal sinuses were found to be intact and on opening were seen to be free of pus. The cribriform plate was also intact, but on removing the roofs of the ethmoids pus of the same character as that found on the frontal lobes was revealed. The sphenoids were similarly involved. The cavernous sinus showed nothing of importance. There was no evidence that the brain had been broken into through operative procedures.

Diagnosis: Subdural abscess.

It would seem that the virulence of the organism, at least in these two cases, was the most important factor determining the final results; as in Case 1 the dura was practically bathed in pus while in Case 2 the organisms apparently gained access to the dura through the emissary veins, the result being the production of a subdural abscess.

257 South 16th Street.

TWO CASES OF UNSUSPECTED FOREIGN BODY IN THE LARYNX.

Dr. Porter Stiles, Birmingham, Ala.

The following cases illustrate the unreliability of negative foreign body histories, as well as the importance of routine X-ray examinations in the presence of respiratory tract symptoms.

Case 1: O. M., female, age 12, was admitted to the Hillman Hospital May 13, 1925, as a case of probable laryngeal injury. She complained of moderate pain in the throat and anterior portion of the neck. She stated that two weeks before admission, while playing, she ran into a wire clothes line, which struck the front of her neck with such force as to cause her to fall down. She was short of breath for a moment after the accident, but had no other symptoms, and soon resumed playing. The following day her neck was somewhat tender, and a day or two later she began to notice a slight but fairly deep seated pain in the throat and neck, constant in character, but more noticeable on swallowing. The tenderness shortly disappeared, but the pain persisted with some increase in its intensity. She coughed from time to time, but has had no severe paroxysms.

On examination the voice was noted to be slightly hoarse, but breathing was quiet and there was no dyspnea. There was no external evidence of injury to the neck or larynx. Inspection of the pharynx and tonsils revealed nothing abnormal. Examination of the chest was negative. An X-ray plate was then made and it showed a straight pin in the larynx, lying in the sagittal plane, with the point anterior.

Without anesthesia, the larynx was exposed with the Jackson speculum, and the pin point was found to be imbedded in the mucous membrane of the anterior commissure just between the vocal cords, while the head rested above the cords in the posterior commissure. There was very little inflammation present. The pin was removed without difficulty, and the patient was shortly discharged well.

She was questioned after removal of the pin, but could not recall ever having had a pin disappear from her mouth, nor did she recall

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having had one in her mouth at the time of the accident. However, in view of the history, it seems reasonable to presume that the pin was in her mouth at that time, and that in the excitement of the moment, its disappearance escaped notice.

Case 2: W. D., male, age 6 months, was admitted to the Hillman Hospital May 25, 1925, with the following history: one week ago

Fig. 1. X-ray showing pin in larynx of Case 1.

began to be fretful and restless, and seemed disinclined to nurse. The following day coughed occasionally, breathed more rapidly than usual, and seemed to have an acute cold. During the next three days continued to cough from time to time, and breathing became noisy and more rapid. A physician was consulted and he decided that the baby had a beginning pneumonia. In spite of

treatment its condition grew gradually worse, and the day before admission another physician was called, who advised taking the baby to the hospital for examination, as he found evidences of respiratory obstruction rather than pneumonia. There was no history suggestive of foreign body nor of exposure to diphtheria.

On examination the baby appeared quite ill. The temperature was 103°, pulse 140 and respirations 50. There was well marked dyspnea with noisy respirations and some indrawing of the epigastric space. The tonsils were fairly large and red, but no membrane nor follicular inflammation was present. Breath sounds were loud and harsh, and coarse rales were heard over both lungs. Expansion was equal and the percussion note showed no impairment over either lung. An X-ray examination was immediately made and it showed an opaque foreign body, apparently in the larynx.

Without anesthesia, the Jackson speculum was introduced, and a short iron bolt with a large, almost flat head was found in the

Fig. 2. Bolt removed from larynx of Case 2.

larynx, the head lying on and between the ventricular bands, and the shaft resting in the interarytenoid notch, protruding into the hypopharynx. The mucosa of the larynx and hypopharynx was quite swollen and excoriated. The bolt was easily removed with alligator forceps, and on examination was found to be of the type used in assembling steel filing cabinet units.

After removal of the foreign body the dyspnea was considerably relieved, but there remained sufficient obstruction due to the supraglottic swelling to require close observation for a time. The following day the temperature came down to normal, and the general appearance of the child was much improved. After four days, the dyspnea had entirely disappeared and the patient was discharged and has had no further trouble.

After considerable questioning, an older child admitted having placed the bolt in the baby's mouth as a pacifier shortly before the first symptoms were noted, and when it slipped from her fingers and disappeared from view, she was afraid to make it known.

510 Empire building.

LUNG ABSCESS, PNEUMOTHORAX, SEQUELAE ESOPHAGEAL FOREIGN BODY.

Dr. E. Lee Myers, St. Louis.

The following case report is made in order that it may be of some help to others doing endoscopic work. An autopsy would have made the case more instructive, but such was impossible under no ordinary efforts.

Case Report: Mrs. P., age 30 years, spare build. Five weeks before our first examination, had attack of "flu", which necessitated her being home, with great prostration, and a severe cough but not completely bed-ridden.

Mar. 18, while eating spareribs and sauerkraut, felt something stick in her throat.

Mar. 24, consulted her physician, Dr. R. Emmet Kane, who did no instrumentation. Case referred to the writer. X-ray and fluoroscopic study by Dr. Gray C. Briggs, which led us to suspicion a foreign body in the region of the cricoid, but after considerable thought, we believed that we were dealing with a "negative to the X-ray" intruder; however, under a local esophagoscopy lasting twenty minutes, we were unable to remove an impacted bone, located benath the cricopharyngeus on the left side. Patient put to bed in good condition, and large doses of bismuth subnitrate given, in conjunction with the physiological dosage of belladonna to allay spasm. While awaiting the second esophagoscopy, the problem was worked out several times on a small dog.

Mar. 25th to 28th, temperature remained at 99 2-5.° No emphysema or neck stiffness present, patient swallowing soft diet and resting fairly comfortable.

Mar. 28, second esophagoscopy, under ether. A slough found in left pyriform fossae anteriorly. No foreign body found on examining entire esophagus through right pyriform. Some blood present during tubing, which was quickly handled with suction. Careful dilatation done with Hill-Dean and Seifert's esophageal dilating speculum did not reveal any spicule of bone. Duration of tubing, forty minutes. Large doses of bismuth continued.

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Mar. 29, patient complained of severe pain in right side chest in early morning. Throat very sore.

Mar. 30, good night, eating soft diet with relish.

Mar. 31, good night, soft diet. Later on this date complained of chest being sore.

Apr. 1, eating soft diet. Patient insisted upon leaving hospital, although in the last two days, patient has had a temperature around 101.° Her swallowing function perfectly normal. No symptoms of perforation can be made out. Tucker's sign negative.

Apr. 2, patient at home, found her swallowing normally. Temperature 100.°

Apr. 4, family phoned, said patient swallowing normally. Temperature 100.°

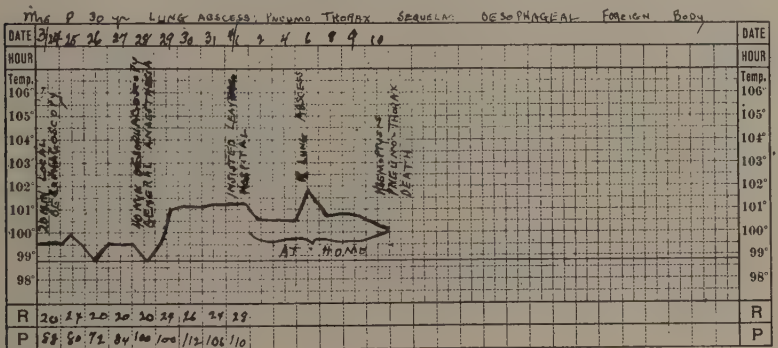
Apr. 6, family doctor found patient coughing severely, odor from sputum terrific. Temperature 102.° Examination made by X-ray revealed a middle lobe lung abscess. Bismuth meal did not reveal a tracheoesophageal fistulae. Patterson's capsule did not hesitate on

descent. Bubble sign of Killian-Iglauer not present, no thickness of posterior wall of esophagus.

Apr. 8, patient remarkedly better, family refused to allow patient to go to hospital in order that lung suction and mapping might be done.

Apr. 9, patient much better this morning, coughing very little, practically without odor. Temperature 100 4-5.° Swallowing perfectly normal. Patient has enjoyed a good day, sitting up in bed most of the day.

Apr. 10, at 2:45 a. m., husband accompanied wife to the toilet, and while straining at stool, had a severe coughing spell, accompanied with considerable hemorrhage. Later in morning, about 4 o'clock, I found patient in shock, due to an acute pneumothorax, from which she did not recover, despite all efforts at stimulation, *i. e.*, caffein, spartein, morphin, hot packs, etc. Oxygen being unavailable, a valuable aid was missing.



Laboratory Reports

CONCLUSIONS.

1. An impacted foreign body in esophagus which seemingly defied safe extraction, upon second examination being missing, implies that large doses of belladonna had relieved spasm of cricopharyngeus, and bone had removed itself.

2. Foul odor of sputum and roentgenological evidence of lung suppuration in so short a time after both endoscopies can hardly be traced to either of these or foreign body, unless it be of lymphatic origin.

3. Presence of tracheoesophageal fistulae cannot entirely be differentiated as patient did vomit up foul smelling material; however, no evidence was found on barium meal test.

4. Unusual hemorrhage in course of lung abscess, with acute pneumo-thorax is seen occasionally in lung suppurations, but not as a result of esophageal foreign bodies.

5. Entire absence of any symptom that would point to esophageal perforation, or those pointing to mediastinal abscess is unusual in deaths resulting from an esophageal foreign body.

6. Death in this case may be ascribed to lowering of resistance following flu, ether anesthesia probably acting as exciting cause of lung abscess. Hemorrhage being due to erosion of arteriole, pneumothorax caused by connection between pleura and terminal bronchiolus.

COCAIN IN NASAL ANESTHESIA; AN ATTEMPT TO ESTIMATE THE AMOUNT OF COCAIN ACTUALLY GETTING TO THE PATIENT WHEN SOLUTIONS OR PASTE ARE USED AS TOPICAL APPLICATIONS.

Dr. E. F. Howard, Vicksburg, Miss.

In the reports of the Committee on Toxic Effects of Local Anesthetics, one point stands out very emphatically—the practically universal use of unmeasured quantities of cocain in nasal work. The suggestion of Dr. Mayer that we should have some idea of the quantity used in any given operation is eminently sensible, if for no other reason than that it might prove a valuable point in the defense of a suit for damages. That suggestion incited the study that forms the basis of this article.

From the operating room nurses we learned that the amount of powdered cocain put on the tray for a septum resection, when it was to be used in the form of paste, was approximately 4 grains. When a solution was to be used, about 2 drams of 10 per cent was the amount ordinarily supplied. It was the general impression that some, whether powder or solution, remained unused, after the operation. Recalling what I have seen in other operating rooms, I am inclined to believe that this represents the average accuracy fairly well.

Dr. Mayer suggested that the amount set out for operation and that left after the operation be accurately determined, in order that we might say "not more than so much was used." But there is a very definite amount of waste, and an effort was made to determine what it might be.

Dr. A. A. Aita, chief of the laboratory at the Vicksburg Infirmary, very kindly undertook the real work of the investigation and personally weighed the powdered cocain and prepared the solutions for use in the operations. A series of septum resections was done, alternating cocain paste and 10 per cent solution for the anesthesia. All swabs, as soon as they are used, were put in a glass receptacle and this, together with the remainder of the original supply, returned to the laboratory. Dr. Aita then weighed, or measured, the unused powder, or solution, and determined the amount of cocain remaining in the swabs.

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We then knew the amount of cocain put out for each operation, the amount unused and the amount wasted—remaining on the swabs —and had therefore a rather more definite idea of the amount actually used than when we had only the first two figures of the equation. The average of the series was:

With	cocain paste,		
	Supplied for operation		275. mgr.
	Returned in original container	174.6 mgr.	
	Recovered from swabs	15.15 mgr.	189.75 mgr.
	Amount used		85.25 mgr.
With	10 per cent solution,		
	Supplied for operation	10. c.c. =	1000. mgr.
	Returned in original container	7.35 c.c. = 735. mgr.	
	Recovered from swabs	39. mgr.	774. mgr.
	Amount used		226. mgr.

The variation is startling. The minimum amount used on any case in the solution series was more than twice that of the maximum in the paste series.

There are two points in connection with the technique of the anesthesia that I have not noticed in the work of others, though doubtless they are familiar to many.

1. By swabbing the septum with adrenalin (1-1000) two or three minutes before applying the cocain, I get quicker anesthesia with less cocain. In using this method, I have not, so far, had any case that showed the violent reaction sometimes seen when adrenalin, alone, is put into the nose.

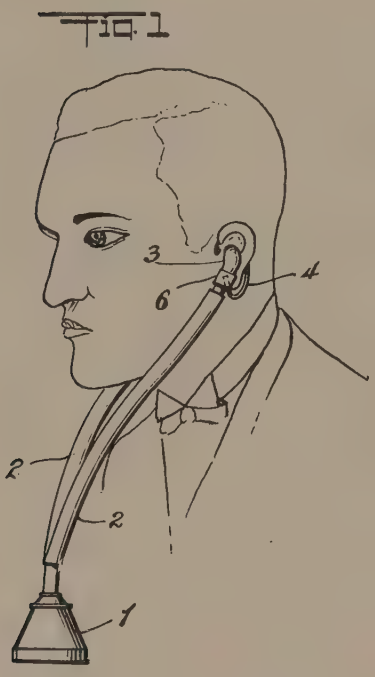
2. In using the paste, a swab is dipped in adrenalin (1-1000) and squeezed fairly dry between thumb and finger, the act of squeezing flattening the swab. One of the flat sides is touched lightly to the powdered cocain until a sufficient amount, estimated, is taken up and this is rubbed on the septum. Thus there is cocain on one side of the swab, only, and little or none gets on the turbinates, which cannot but be the case when swabs saturated in solutions are used. Therefore a smaller area of the nasal mucosa is absorbing cocain.

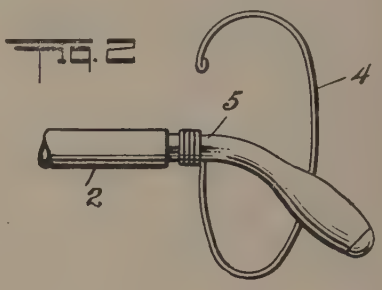
Undoubtedly the entire investigation is on too small a scale to really mean anything, much less to be conclusive, but if the idea is to subject the patient to the least possible risk—and even the 51 mgr. that constituted the minimum amount used in the entire list might cause trouble in a susceptible patient—the matter seems worthy of consideration.

A HELPFUL INSTRUMENT IN THE CATHETERIZATION OF THE EUSTACHIAN TUBE.

Dr. Louis Blumenfeld, Brooklyn, N. Y.

When I first began to catheterize Eustachian tubes, I found that the most difficult thing was not to locate the nasal opening of the tube, but to keep the diagnostic tube in my own ear. Just as I was getting all set to inflate the middle ear, the diagnostic tube would fall out of my ear, and at times it was most difficult and annoying





to try to keep the diagnostic tube in the proper axis of the canal of the ear. If the tip of the diagnostic tube would stay put, it would point in most every direction except in the direction of the axis of the canal of the examiner's ear. The weight of the rubber tubing would cause it to point upward and toward the posterior-superior canal wall, so that if I was fortunate in having the tube stay in my

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ear, I would not get the full value and force of the sounds produced in the middle ear by inflation.

I therefore began to look for some method or means whereby the diagnostic tube once inserted into the ear would stay put and would point in the axis of the canal. I hereby offer the results of my efforts to my colleagues, and hope that it will help them as much as it has me. With this little adaptation I can place the tip of the diagnostic tube in my ear and forget it. It stays there and always points in the proper axis of the canal.

Previous to its use I confess I commenced a catheterization with misgivings, and at times I almost lost my temper, when I repeatedly inserted the tube and have it fall out every time either I or the patient moved. Since I had this little instrument made, catheterization has become a pleasant process to me and I believe my disposition has improved. The instrument is very light, practically without weight, and does not hurt the ear even after it has been on for a long time.

I have also had a pair of these ear clasps made for a small pocket stethoscope and use it instead of the usual bulky binaural stethoscope. I find it far superior to the ordinary scope, in that it is:

1. Less bulky; it does away with excess and useless metal.

2. Does not hurt or exert pressure on the ear canal.

3. It really makes the stethoscope a pocket stethoscope, easy to carry about your person and yet does not lose any of the efficiency of the old regulation binaural stethoscope, in that it remains fixed in the ear and in the proper axis of the canal.

The accompanying drawings are very plain and no further explanation of this little instrument is necessary.

1564 St. Marks avenue.

THE USE OF GOLD-WIRE SPLINTS IN INTRANASAL PLASTIC SURGERY.

Dr. William Wesley Carter, New York City.

Owing to the large number of inquiries which I have received from my confreres in various parts of the country concerning the use of gold-wire splints in the after-treatment of intranasal plastic procedures, especially the sub-mucous operation, and the fact that I have made no detailed report of this method since my first introduction of the subject before The American Laryngological, Rhinological and Otological Society several years ago, I feel that a description of the use of this splint may be of some practical value, especially as years of experience have added to my knowledge of its efficiency.

Though I make use of gold wire as a splint in many of my nasal deformity operations, I will refer only to its use in the submucous operation on the nasal septum, where the demand for a splint of this kind is constant.

Every experienced rhinologist knows that after the submucous operation the patient objects more strenuously to the plugging up of his nose than he does to the operation itself, and yet the surgeon knows that the submucous flaps must be pressed together and held by some means until the danger of hemorrhage is passed and primary union has taken place. I first advised the use of narrow strips of vaselin gauze as a packing. As this was put up in test tubes and sterilized, it made an ideal packing. The objections to its use are: it is uncomfortable to the patient, as nasal obstruction is complete, drainage is not free and when the gauze is removed hemorrhage is apt to occur, sometimes to an alarming extent. I still use vaselin gauze where I feel that it is especially indicated, but these cases are now limited almost exclusively to my nasal deformity work; in doing the submous operation I have found the wire splint preferable.

The gold-wire splint is made just before the operation and is shaped to suit each individual patient. First an obturator, somewhat in the shape of the Asch hard-rubber splint, is whittled out of white pine; this is made a little smaller than the nasal cavity,

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around this obtubator, in a spiral is wrapped a piece of No. 7 dental gold-wire, usually about 12 inches long. The spiral thus formed is pressed firmly with the fingers, in order to overcome the tendency of the wire to straighten. The splint is covered with vaselin and transferred directly into the nose from the obturator, or it may be removed from the latter and introduced by means of a pair of long, straight hemostatic forceps. I usually place the splint in the side where the incision is made first and then introduce a similar one in the other side. When the splints are adjusted, the ends of the wire are bent inward. The anterior end of the splint should rest in the vestibule and below just within the anterior nares. Care should be taken that none of the wire coils are left pressing into the incision.

The action of these splints is to keep both nasal cavities wide open, and to hold in close contact with each other the submucous flaps by a continuous light, springy pressure. The advantage of this will be recognized at once by the experienced rhinologist. Hemorrhage, both primary and secondary, is less apt to occur; consequently the risk of hematoma, with its attendant danger of infection and abscess formation, is very much less. The secretions from the nose and the drainage from the operative wound have free exit. The nasal cavities can be easily cleansed and the progress of the case noted by direct vision. It is difficult to estimate the advantage to the patient who is able to experience at once free nasal respiration and to enjoy the benefits of the operation as soon as it is finished.

Unless there is some contraindication, I remove the splint on the third day. This is done by catching the ends of the wire with the thumb forceps and gently pulling. The coils readily straighten out and the removal is effected with no difficulty and little discomfort to the patient.

The subsequent treatment consists merely in keeping the nose clean, a mild alkalin solution being best suited for this purpose.

24 East 48th Street.

A NEW DOUBLE NASAL SPECULUM.

Dr. M. Joseph Mandelbaum, New York City.

Various means have been devised whereby the rhinologist might obtain a simultaneous anterior view of both nasal chambers for the purpose of diagnostic inspection and also for intranasal operative procedures; principally that for submucous resection of the septal cartilage.

Among the better known instruments for this purpose are those by Levy, Levy-Struycken, Killian and Unger.§ These, however, are all self-retaining and their chief disadvantage is that when both pair of speculae are in position, the tissues of the nasal vestibules become fixed and the resultant rigidity does not permit the degree of mobility necessary to manipulate the instruments.

To overcome this difficulty I devised a double nasal speculum which consists of the commonly used type of bivalve speculum, to the distal end of which an extra pair of retracting blades are attached by a small connecting bar; the interval between the two pair of blades being sufficiently wide and deep to permit the reception of the columella and inferior portion of the nasal septum.

The speculum is so arranged that when the opposing blades are separated, the distal pair separate the same distance as the proximal pair.

The speculum may be used as a single speculum for either side. If held in the left hand of the operator in examining the patient's right nostril, the distal blades are utilized. For examining the left nostril the proximal blades are used.

For rhinological work it serves a double advantage, diagnostically and surgically.

For the purposes of diagnosis, upon inserting the instrument simultaneously into both nostrils and spreading the blades, one gets at once an excellent exposure of both nasal chambers permitting one to estimate immediately the degree and nature of septal irregularities and deviations and especially to determine the *thickness* of the nasal septum in its various parts, which is not possible with the old single type of nasal speculum. It also permits a more satisfac-

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§Unger, Max: A new, double, self-retaining nasal speculum, J. A. M. A., Vol. LXII, 1557, (May 16) 1914.

tory inspection of both nasal chambers for the purpose of comparison of the two sides.

It is of particular advantage in the operation for submucous resection of the septum, inasmuch as with the single pair of blades one has to shift the instrument from time to time from the side being operated upon to the opposite side, to note whether there is danger of perforating the mucous membrane on the other side.

In doing so one frequently loses not only time, but the position of the end of the instrument used for the separation is lost. With the double nasal speculum this difficulty is obviated and one can proceed with greater certainty as well as rapidity, as it is only necessary to throw the reflected headlight to the side desired without moving the speculum.

Another use to which the instrument lends itself is of a very distinct advantage, *viz.*, in packing the nasal chambers after various intranasal operations and particularly in the operation for submucous resection of the nasal septum, the amount of pressure from the packing should not be great enough to push the septum too far beyond the median line into the opposite nasal chamber. With the single nasal speculum one cannot see how far the septum is bulging into the opposite nasal chamber without removing it, as in so doing one loses time as well as the position at which the speculum was placed before its withdrawal; with the double nasal speculum one can readily inspect both sides while the packing is performed and the proper amount of gauze needed can be introduced without producing harmful pressure, thus insuring an accurate vertical position of the resected septum in the median line, preventing undue strain on the sutures and rendering certain a satisfactory end-result.

The speculum was made by Geo. P. Pilling & Son, of Philadelphia.

125 West 72 Street.

A NEW ARTIFICIAL EAR DRUM.*

Dr. H. J. Isaacs, New York City.

Almost any foreign material introduced into the ear, will, in certain cases, act as an artificial ear drum. In cases of dry perforation of the membrana tympani, where the tuning fork tests show little or no secondary nerve degeneration, the use of this artificial ear drum shows an immediate and striking improvement in the hearing. And yet this simple means has, of late, been allowed to fall into disuse, because of the two great disadvantages possessed by all the drums now employed. The first is the annoyance of changing the drum daily and the second is the tendency which they have to initiate an otitis media or an external otitis.

Although the oldest medical literature makes mention of the practice of introducing foreign bodies into the ear to close over perforations, this was done merely as a protection to the tympanic cavity and had no relation to the function of hearing. James Yearsley, in 1848, was the first to note that in some cases the mechanical closure of the perforation caused a marked improvement in the hearing immediately. He discovered this empirically, and since his time many theories have been proposed to explain the principle of action. Thus far none of these theories seems to fit all cases. We are dealing here with a derangement of the mechanics of the middle ear, and until the exact mechanics and functions of the ossicles and drum, and the exact manner in which a perforation disturbs these functions is known, we will not be able entirely to explain how the artificial drum restores hearing.

As a working hypothesis, however, we may make use of the following simple explanation which will serve all practical purposes: With an intact drum the sound waves are impressed more forcibly upon the oval window, the consequent intralabyrinthine pressure being compensated for by the resiliency of the round window. In other words, an internal movement of the oval window is accompanied by an external movement of the round window, and vice versa. With a perforation of the drum the round window is exposed to the direct action of the sound wave, and its movement, which is contrary to that of the sound wave, is inhibited. The

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*Read before the Section on Otology, New York Academy of Medicine, May 8, 1925. From the Oto-Laryngological Department of Beth Israel Hospital.

amount of hearing varies inversely with the amount of interference with the movement of the round window. In cases where the pressure is sufficient to inhibit its movement completely, hearing will be *nil*. The artificial drum, by closing the perforation, and thus shielding the round window from the direct action of the sound wave, may be conceived of as restoring the normal relationship of both windows.

In practice, the artificial drums that have been used fall into two distinct classes: The Yearsley and the Toynbee types.

The Yearsley drum is merely a pledget of cotton moistened with water, salin solution or liquid abolene, which is placed in contact with the membrana tympani. This has to be done under direct illumination, and its insertion is rather difficult, as, unless it is placed in exactly the right position, it will tend to make the hearing worse instead of better. Its removal by the patient himself is attended by the danger of injuring the canal and tympanum, or of allowing a small portion of the cotton to remain behind. Its main disadvantage, however, is that of introducing a fluid into a previously dry tympanic cavity, causing in a short time, a maceration of the delicate epithelium of the ear drum and tympanic cavity. It must be removed every day and the ear must be carefully cleansed and dried before reinsertion.

The Toynbee drum consists of a thin disc of rubber to which is attached a short silver rod. This is far preferable to the Yearsley drum, but likewise has features that condemn it. Introduction and removal are painful, excoriations and abrasions of the canal being easily produced. Chewing and swallowing produce loud cracking and thundering noises. The rod itself may injure the canal wall and produces an unpleasant sensation by its vibration. This drum must not only be removed every night and reinserted in the morning, but the ear must become accustomed to its presence by the wearing of it for short periods every day. It deteriorates rapidly and must be renewed frequently, and therefore involves somewhat of an element of expense.

The main objection to both of these drums, however, is that they will, almost invariably, cause the production of an acute otitis media in an ear which has previously been dry. The maceration and congestion produced by their presence lessens the resistance of the part, and forms a favorable culture medium for the growth of whatever organisms happen to be present, or may be introduced, by the frequent manipulation required. The fact that we are introducing a foreign body into a very sensitive region has apparently been over-

looked. Consequently no special attempt has been made to employ a non-irritating substance.

It was mainly to overcome this objection that I have devised the drum which I now wish to present. It is made of ordinary flexible collodion. This is inert, insoluble in the body fluids, and, as has been demonstrated, produces no foreign body reaction, even when buried in the tissues.

These drums can be made in a few moments from material which is almost always at hand. A short glass tube, sealed at one end, is used as the mold. This should be of the approximate length and width of the patient's external auditory canal. The tube is cleaned with alcohol and ether and thoroughly dried. A few drops of collodion are poured into it and the tube is slowly rotated until the collodion forms a smooth inner coating. In from two to three minutes the collodion will have hardened sufficiently to be removed. By means of a forceps, it is gently separated from the glass, from which it detaches easily, and extracted from the tube. This leaves a soft, pliable, transparent tubule, similar in size and shape to the original glass mold. A cotton-tipped applicator is inserted into it and the drum is introduced to the bottom of the canal. Here, by gentle manipulation it is applied in close apposition to the perforation or internal tympanic wall. The placing of it in correct position is rendered simple by the transparency of the drum, through which the structures behind it are visible.

I have been using this type of artificial drum for the past four years with excellent results. It is made in a few moments, as required. I have even taught some of my patients to make the drums themselves, and they quickly acquire the knack of inserting and removing them. Since the drum is non-irritating it does not cause any reaction of the tissues with which it is in contact. Hence it may be allowed to remain in place indefinitely. There are two indications for changing it. The first is an accumulation of cerumen, which has to be removed. The second is a shifting of position, which evidences itself by a return of the deafness and tinnitus. Otherwise no attention need be paid to it.

Summing up, the drum herein described combines the softness of the cotton pledget of Yearsley with more convenient form of Toynbee's rubber disc, and is pliable, transparent, easily made, non-irritating, and semi-permanent.

120 West 86th Street.

A NEW PARACENTESIS KNIFE.

Dr. Samuel Cohen, Philadelphia, Pa.

The incising of the membrane tympani is usually not fraught with any danger, but occasionally some untoward sequence follows, and the operator immediately tries to find some means of preventing a recurrence of his unpleasant experience. The accidents incident to this minor procedure (paracentesis tympani) are the puncturing of the lateral sinus, which may be placed far forward; the opening into the jugular bulb, especially when a dehiscency exists; or an incision into the carotid artery. The cutting of the facial nerve also may occur, and can be cited among the possible accidents incident to the operation.

An occurrence that is very frequent, and one that some claim is not harmful, while others claim that it may produce a great deal of damage, is the striking of the inner wall of the middle ear (prom-

ontory). Some of us believe that striking the inner wall of the middle ear may lead to an inflammatory process in the middle or internal ear, with subsequent unpleasant results. All must admit that it is better not to strike the promontory if possible. This knife was made especially with that purpose in mind.

The blade is short, .1093 of an inch in length; .0468 of an inch in width; and .014 of an inch in thickness. The shank is .058 of an inch thick. The length from the screw to the shank is 2⅝ inches. The blade is pointed and has a slight curve so as to enable the operator to cut in a definite direction. The handle is so constructed that when the knife is not in use it can be reversed and fitted into it.

The distance between the drumhead and the promontory is much greater than the length of the balde, thus making it almost impossible, when due care is used, to touch it in doing a paracentesis. Instinctively the operator stops penetrating the knife as soon as he feels the shank touch the drumhead.

2009 Pine St.

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IN MEMORIAM

FRANCKE HUNTINGTON BOSWORTH, A. B., A. M., M. D.

By Dr. D. Bryson Delavan, New York.

I desire to ask attention to an event of profound interest to the world of laryngology, an event which removes one to whom all civilized mankind are under a debt of obligation, the weight of which the present generation can hardly comprehend.

Dr. Francke Huntington Bosworth—Patriot, Student, Investigator, Teacher, Writer, Inventor, Creator—is dead! Dr. Bosworth was the son of Daniel P. Bosworth, a merchant, and Deborah Wells Bosworth, his wife, both of New England origin dating back many generations. He was born January 25, 1843, in Marietta, Ohio, where his school days were spent, and where he also attended Marietta College from 1858 to 1860. At the outbreak of the Civil War, President Lincoln called for volunteers for a period of three months, no one then dreaming of the long continuance of the war. Young Bosworth at once enlisted and was sent with his company to West Virginia, under General Rosencrans, where he came in close relations with the enemy. At the expiration of his term of enlistment he returned North and entered Yale College, graduating in the class of 1862. A number of men who distinguished themselves in medicine were at Yale in Bosworth's time, among them Dr. A. Brayton Ball, Francis Delafield, James W. McLane, Edward L. Keyes, Lewis A. Stimson, Albert H. Buck and Thomas E. Satterthwaite, all of whom were members of the New York Academy of Medicine.

Immediately after graduating, Dr. Bosworth returned to Marietta and again enlisted, in the Quartermasters Department, in the Ohio State Militia, with a company made up from his fellow-townsmen. The regiment was sent to the Peninsula, where it was engaged in active service, taking part in the repelling of General Morgan's raids

and during the summer of 1864 serving around City Point, Virginia. Having completed his military service, he determined to take up the study of medicine, came to New York, and matriculated at Bellevue, from which school he graduated in 1869 as valedictorian of his class. He then secured an interneship at Bellevue Hospital, and having completed it, entered upon active practice in New York City.

He at once became interested in the study of the diseases of the upper air tract, and in 1871 was appointed lecturer upon this subject at Bellevue. In 1881, he was apointed to a full Professorship, which he held until 1898, when the Bellevue school united with the Medical Department of New York University, Dr. Bosworth continuing in his position as Professor until his final retirement from active work.

The career of Dr. Bosworth was marked by great industry and untiring energy. Enthusiastic in the development of the department of his choice, he gave to it the full devotion of his life. He distinguished himself as a writer, a teacher, and a practitioner, but it is upon his eminence as a pioneer contributor to the pathology of laryngology and rhinology that his fame will endure.

His theses and published articles, covering a long period of years, were numerous, comprehensive, and valuable. Possessed of unusual literary ability, his style was clear and forceful. The many new ideas which he advanced were upheld with the full courage of his strong convictions, not seldom against adverse but, as time proved, mistaken criticisms. In discussion he delighted in drawing forth the arguments of the opposition, not so much for the pleasure of successfully refuting them as for the profit of recasting and correcting such of his own views as might be imperfect before finally committing them to print. He had well learned the secret for the successful launching of a new idea, namely, that to cause it to be accepted it must first be intrinsically good, and then brought vigorously before the world by persistent, oft-repeated attacks through the media of the journals, the lecture, and the Society debate. With

untiring industry and rare singleness of purpose he worked for the advancement of his chosen art.

Early in his career, he entered upon the field of publication and in 1879 issued a "Handbook Upon Diseases of the Throat for the Use of Students." In 1881, appeared his Manual of Diseases of the Throat and Nose. For the next ten years he was busily engaged in the preparation of his greatest work, a treatise in two large volumes on "Diseases of the Nose and Throat." These volumes appeared, respectively, in 1890 and 1892. Meanwhile, the importance of the nasal region, never before fully appreciated, had impressed Dr. Bosworth so forcibly that in this publication he changed the sequence of the title of his work, and for the first time in history, instead of using the time-honored title—Throat and Nose—reversed the order. Finally, in 1896, he issued his "Text-book on Diseases of the Nose and Throat," a book which for many years enjoyed the popularity which it deserved.

The treatise of Dr. Bosworth in two volumes, published in 1890, was a monumental contribution to Laryngology. Together with the pioneer work of Dr. J. Solis Cohen, of Philadelphia, published in 1878, and that of Sir Morel Mackenzie, which appeared in 1882, it marked an epoch in the advance of our specialty. Works had been published by the early laryngologists in various countries of Europe, some of them of distinguished merit, but it remained for Dr. Solis Cohen to present the first really comprehensve treatise upon the upper air passages ever issued. It dealt with the whole realm of the subject, and was beyond question a determining influence in establishing upon a definite basis the specialty of Laryngology. Dr. Mackenzie's classic work, which followed in 1882, was different in style from that of Dr. Cohen, but scholarly, practical, and complete, it embodied the wide and long-continued experience of the most accomplished laryngologist of his time.

The therapeutics of the specialty, theretofore chaotic and eminently crude, were by Mackenzie reduced to a scientific basis. Many of his remedies and methods have never been improved. Finally,

with the appearance of Bosworth's great work, the specialties of laryngology and rhinology were thoroughly placed before the world.

It is interesting and significant to note that this great scientific accomplishment was attained by three English-speaking men, two of whom were Americans.

In the study of rhinology, Dr. Bosworth became more and more impressed with the eminent importance of the nasal cavities. Upon the early recognition of this fact, he greatly prided himself.

His success as a teacher was attested by the large number of students who sought his instruction at Bellevue over a period of many years. His enthusiasm was genuine and infectious, and through his disciples as well as through his writings, served to carry far and wide the knowledge of the new science. The vast numbers of patients who resorted to the Bellevue clinic gave abundant opportunity for observation and investigation, which he zealously improved. A keen diagnostician, he utilized his material not only for teaching purposes but for the development of his original and progressive ideas. No case of importance escaped his skillful handling, his carefully noted records, and the knowledge thus obtained was later widely diffused through his able publications. This practice carries a weighty suggestion: First the case, its study and treatment; second, the record; third, the book.

In the course of Dr. Bosworth's writings many new ideas were presented, most of them original, some the application of the suggestions of others. While distinguished in many directions, he will always be best known by his notable contributions to rhinology. Prior to his time the nasal region had been largely ignored. The

The causes of mouth breathing, the physiology and pathology of the sinuses, the existence of remedial nasal obstructions, received no attention, even among the leaders of laryngology. The distinguished American observer, Catlin, had long before recognized the existence of mouth breathing and had warned of some of its evil results, but neither he nor anyone else had clearly recognized its causes or suggested means for their relief until Dr. Edward Woakes, of London, published some ideas upon what he called "necrosing

ethmoiditis," and advocated the use of the saw for its relief. As commonly hppened in those days of the tardy recognition of good work, the ideas of Dr. Woakes were not generally accepted. Dr. Carl Seiler, of Philadelphia, a man of great discernment and originality, who first used the perforated nasal splint afterwards perfected by Asch, attempted to remove septal obstructions by means of a metacarpal saw. Before the days of local anesthesia this was difficult and unpopular. Bosworth also had been studying the matter. He found that many serious conditions of obstruction were caused by septal ridges and spurs. No other treatment of them was practicable but their mechanical removal. Certainly at this particular time fortune smiled upon Dr. Bosworth, for coincidently with the idea which had come to him cocain was introduced, he devised his admirable little saw, and the riddle of nasal obstruction due to septal spurs was solved. True, better methods have been found since that early time. Bosworth's method was not perfect, and, besides, little heed was paid to the mucous membrane, but the results he obtained by it in those early days were often remarkably good. Through Bosworth's eloquent advocacy and through the oft-repeated visible evidence of the value of the method, its popularity was almost instantaneous. By this and by his other valuable contributions, the attention of the world was directed to the nasal region. Brilliant scientists like Jarvis, Harrison, Allen, Bryan, John Mackenzie, Roe, Shurly, Daly and others in this country, Moure, of Bordeaux, Zuckerkandl, of Vienna, and others of the continent of Europe and in Great Britain took up the study and the science of rhinology was triumphantly launched.

One of the most interesting phases of Dr. Bosworth's life was his connection with the New York Laryngological Society, the parent of the Section on Laryngology and Rhinology of the New York Academy of Medicine. The story of the founding of this Society should be familiar to all. It is probable, however, that few have heard of its origin and realize the important influence which it exerted in the early days of laryngology. This is true largely because of the inaccuracy of the reference that have been made to it by those

who have mentioned it in their historical reports. In these it has been cursorily dismissed as "a society which had a brief existence and was soon lost sight of." No one should be willing to thrust the matter aside so cavalierly, for the New York Society was the first Society of Laryngologists in modern history. Founded in 1873 by Dr. Clinton Wagner, Drs. Bosworth, Lefferts, Asch, Woolsey Johnson, Kinnicutt, Mann, McBurney, and Weir were its Charter Members. It was the birthplace of scientific rhinology, and in many respects the cradle of modern laryngology in the United States. The men who organized it had received special instruction abroad and represented the very best element of the profession of the time. The Society was organized not only for mutual improvement and the advancement and enlargement of the limited knowledge of the nose and throat, but also with the view of establishing on a sound footing with the medical profession the specialty of laryngology in this country, for the reason that many of the physicians of the time looked askance at all specialties.

Following its founding, monthly meetings were held regularly at the houses of members of the Society for about ten years. The membership was gradually increased, the meetings were well attended, and much enthusiasm was shown in the advancement of the infant science. Familiar with their character and purport during the later years of the Society, I cannot recall the memory of them without a thrill of pride. Many of the members were engaged actively in the pioneer work which made them famous, and it was at the meetings of the Society that their epoch making ideas were first exploited and discussed. With such men, and others like them, young, brilliant, and filled with enthusiasm for the new art, it is not strange that the contributions of their genius and the discussions on them should have made the meetings of the Society well worthy of an honorable place and a clear and permanent record in the history of medicine.

Among the noteworthy members of the Society, none was a more regular attendant at its meetings or a more valuable contributor to them than Dr. Bosworth.

Dr. Bosworth was an Episcopalian and in politics a staunch Republican. Regarding him from the human side, his general interests were wide. He had many acquaintainces among actors and dramatists. In his earlier days he was fond of horses and gained much diversion from daily drives along the uptown speedway behind his handsome fast trotter. Among the first to take up golf as an exercise, he played with vigor for many years, although never highly expert. His interest in vne arts was discriminating and accurate. He was a member of the Union, the Players, and the Social Arts Clubs, and of late years a familiar figure at the University Club.

Considering the work of the present day in relation to what has preceded it, and while fully appreciating the great advances made, we are met with the fact that much valuable matter of other days has been lost. This deeply impresses upon us the importance of going backward and studying carefully the methods of the great masters of laryngology. Many valuable lessons are still to be learned from them, chief of these, perhaps, that not all of the good things of laryngology are utilized by us today. In certain instances methods which a number of years ago were recognized as valuable have been completely supplanted by others not nearly as good. A new thing is not necessarily better because of its novelty. Another distressing fact is the ease with which the names of our instructors have in so many instances been forgotten, simply because some recent successor has made a slight modification of a method which is in itself classic. Here, after all, as in all other departments, wide and accurate knowledge, based upon rich experience, keen judgment and, finally, a highly conscientious view of the best interests of the patient are essential. In all the things in which Dr. Bosworth was pre-eminent, his work is well worthy of our attention today.

It may be that in the time to come Dr. Bosworth will be known by some one of his lesser gifts to medicine, but in company with Solis Cohen and Sir Morell Mackenzie, he, more than any who had gone before gathered together the disjointed and scattered fragments of laryngological knowledge, developed the science of rhinology, and,

welding all into a perfectly co-ordinated form, intelliently established them as definite departments of medical science.

He was a man of ideas; a dreamer of dreams, dreams in which he himself believed; a man strong enough and earnest enough to make his dreams come true, and to impress the truth and the value of them upon the world. Great ideas grandly impressed can only come from one who in himself possesses elements of greatness.

Dr. Bosworth was a member of the New York Academy of Medicine, the American Medical Association, the American College of Surgeons and of many smaller medical associations. He was a charter member of the New York Laryngological Society in 1873 and a Founder of the American Laryngological Association in 1878 and its President in 1883. Distinguished recognition was shown him abroad. He was an Honorary Fellow of the National Associations of Great Britain, France and Germany. At the Eighth International Medical Congress, held in Copenhagen in 1884, he was a conspicuous member.

Dr. Bosworth was married September 21, 1871, to Miss Mary Hildreth Putnam. Mrs. Bosworth died about ten years ago. Two children survive him, a son, F. H. Bosworth, Jr., Professor and Dean of the School of Architecture in Cornell University, and a daughter, the wife of Walter R. Herrick, of New York City.

IN MEMORIAM

HENRI LUC, 1855—1925

By Dr. J. Guisez, Paris.

We cannot close this tomb without giving expression to the sentiments of his confreres in laryngology.

Luc was a man of striking intelligence, a forehead modeled like that of Verlaine with the eyes of a thinker, bright, reflecting his thoughts exactly and his clear mind. A first acquaintance with Luc was always favorable and this impression grew all the stronger as one conversed with him, not alone upon the subject of medicine, but upon a multitude of subjects which interested him—literature, art and foreign languages, for which he had a veritable passion.

At the very beginning of his career, he devoted himself to our specialty as it was practiced in France at that time. He went to Vienna in 1887 to study the new methods which were attracting attention and he brought them to France and put them into practice, but not without a special touch that marked his originality. From that time on, he attempted the radical cure for suppurations, a procedure that was rarely ventured at that period. He described several operations which are still classics and which are known by his name in the French and foreign text-books; Ogston-Luc for the frontal sinus; and Luc-Caldwell for the maxillary sinus operation.

In 1899, with Dr. Ruault, he founded the Archives Internationales c'Oto-Rhino-Laryngologies, a periodical which he continued to publish until 1896, and in which appeared a large number of his original articles, analyses and the most important articles appearing in foreign journals, which kept his colleagues informed of the evolution of the specialty. Among the most important work of this initial period was the first article on the "Suppurations of the Maxillary Antrum" and a memoir on "Tracheal Ozena," an affection not previously described.

In 1890 at the International Laryngological Congress at Berlin, he made a report on the Evolution of Adenoid Vegetations at different ages.

In 1892, he published a very complete treatise on Laryngeal Neuropathy in the Charcot-Debore Collection. In 1895, he was invited to the meeting of the British Laryngological Association in London to open the discussion on the "Surgical Treatment of Affections of the Accessory Cavities of the Nasal Cavities" and in 1899 he was invited by the same association to report on the subject of "Indications for Surgical Intervention in the Mastoid Cavity." During the same year at Portsmouth, he presented one of the first known cases of "Osteo-myelitis Invading the Cranial Bones."

In 1903, at Washington, he presented a paper on "Surgical Opening of Suppurating Frontal Sinus." In 1905, at Brussels, he made a report of a new case of Osteo-myelitis, and at the Congress of Buda-pesth, in 1910, a memoir on the same subject was contributed. He took a prominent part in the discussion on Laryngology under local anesthesia at the Vienna Congress in 1906.

In 1911, at the Berlin Congress, he presented a Memoir on the "Radical Cure for Chronic Suppuration of the Frontal Sinus," and in 1912, at Boston, he gave the first-time description of "Subperiosteal Mastoid Abscess, Without Intra-osseous Suppuration." Finally, in 1912, at the Oto-Laryngological Section of the International London Congress, he was a leading advocate of Local Anesthesia in the principal operations of Oto-Rhino-Laryngological practice.

Dr. Luc was one of the oldest members of the French Society of Oto-Rhino-Laryngologists and was both Vice-President and President of the Society, and was one of its most regular attendants. It was there that he reported his work on "Surgical Operations of the Nasal Accessory Cavities Aiming Toward a Radical Cure of Their Suppuration." Through his works a surgical direction was given our specialty which it has conserved and which in reality marks its ascent.

Luc exemplifies what will-power may accomplish. Without official encouragement, in a modest clinic, he created a real school, to which French students and foreigners came for many years to complete their special education. No foreign colleague came to Paris without visiting Luc's clinic. He had a real gift for instructing others and his courses were so clear that interest in them never flagged. The treatise embodying these lectures met with consider-

able success.* The series of facts and observations made at the bed-side, composing the treatise, read as easily as a recital of news.

His knowledge of foreign languages, which he spoke with such facility and elegance when attending different congresses, caused one President to remark, "I do not know whether to congratulate Dr. Luc more upon the form than the substance of his discourse." This knowledge attracted many specialists to his clinical demonstrations and I recall hearing him explain the technique of one of his operations in four different languages.

All of his knowledge and his organizing ability was given to the service of his country when the war began and though military obligation did not require it, he assumed the heavy task of directing the oto-laryngologic service at Val-de-Grace, whose incumbents were at the front. These services were recompensed at the end of the war by the ribbon of the Legion of Honor; he had been a chevalier since 1904. At the close of this intensive application, he felt the first symptoms of the incurable ailment which slowly brought on his end, though his admirable mental faculties suffered no diminution.

His colleagues and his friends, who regret sincerely his demise, value even more than his scientific merit his great affability, the hearty welcome which colleagues and students always received, and the courtesy with which his discussions were carried on in our societies. At first sight he may have appeared severe, but this very severity he imposed upon himself and it hid an excellent heart. He was a model of professional integrity in all his acts as he was frank in his speech and in his writings.